

表 4.4.1 主要情報提供者に対する聞き取りガイド (1/2)

Key Issues	Key Informants	Key Questions
<ul style="list-style-type: none"> * Identification of the overall population to be served by the Nyarupakwe Pilot Project * Identification of sub-groups of diversified needs from one area to the other * Socio-economic profile of each sub-group 	<p>GSDA, Agritex EO, VSO, Ward's Local Councillor Local Committee's Chairperson</p>	<ul style="list-style-type: none"> * Who and Where do you consider to be the legitimate population that should be served by the Nyarupakwe * What categories of different sub-groups can be easily identified? * How do you come about with such categories?
<ul style="list-style-type: none"> * Description and examination of historical activities of agricultural development * Action and efforts made by local population for operation and maintenance * Satisfaction/dissatisfaction with government * Willingness and ability to participate 	<p>GSDA, Agritex EO, Headman</p>	<ul style="list-style-type: none"> * Have the local people been involved in any agricultural and rural development projects in the past? * In cases where government was involved, how good was the government's involvement? * In what capacity were the people involved? * Who had initiated these projects? Where and why? * What was the community's input? * Was every one involved, if not Why? * In what way did the community benefit? * Was the community willing to participate in the NDP and What could constrain their participation?
<ul style="list-style-type: none"> * Experience of local population with new crops and cropping patterns and its agricultural management * Conflicts among local population * Local customs and beliefs that could influence farmer organisation formation and functioning * Needs of deployment community mobilization 	<p>Agritex EO, VSO, Councillor, Headman</p>	<ul style="list-style-type: none"> * How well has introducing new crops and cropping patterns been accepted by the people? * Were there any difference before and after? * Were there any new technological innovations introduced with projects? * Are the activities connected with such projects still
<ul style="list-style-type: none"> * Differing roles of males and females and time allocation in household and productive activities * Relative access of men and women to resources for the use of agricultural facilities and their potential 	<p>VSO, Traditional Leaders, School Headmasters, Kraal Heads, Shop Owners, Cooperative</p>	<ul style="list-style-type: none"> * What type of gender cohesion, if any, is observed in this area? * What household task do women perform?

Note: EO - Extension Officer, VSO - Veterinary Service Officer, GSDA - Gokwe South District Administration

表 4.4.1 主要情報提供者に対する聞き取りガイド (2/2)

Key Issues	Key Informants	Key Questions
<ul style="list-style-type: none"> * Priority of the needs of sub-groups * Differences among sub-groups in terms of priority of needs in Nyarupakwe Pilot Project * Decision making by males and females on major farming activities 	<p>Agritex EO, VSO, Headman, Kraal Heads, Cooperative Managers</p>	<ul style="list-style-type: none"> * For each and every sub-group that you have identified, please identify related needs to agricultural * Specifically how do you think the local population will benefit from an agricultural development? * How would you rank these needs, starting with most * What difficulties do you think men and women participating in irrigation activities? * What agricultural activities do women perform? * What agricultural activities do men perform? * What household tasks do men perform? * Who owns agricultural resources and facilities in this area (i.e. land, equipment, etc.) * Who controls the use of land in this community? * Who decides on major projects and farming activities in this community?
<ul style="list-style-type: none"> * Sub-groups that may be disadvantaged by Nyarupakwe Pilot Project * Socio-economic profile of each vulnerable sub-group * Options of avoiding, mitigating or compensating sub-groups in relation to Nyarupakwe Pilot Project 	<p>Agritex EO, Ward's Local Councillor, VSO, Kraal Heads, Headman, Farmers Sub-groups</p>	<ul style="list-style-type: none"> * Who do you think will be disadvantaged by the NDP and how? * Do you think there will be some people who will not be willing to relocate as agricultural project is introduced. * What can be done to make sure that these people will not be greatly affected?

Note: EO - Extension Officer, VSO - Veterinary Service Officer, GSDA - Gokwe South District Administration

表 4.4.2 パイロット地区住民のニーズとデマンド (1/2)

Figures indicate 1: First, 2: Second, 3: Third, VL: Very Low"

Item	Subgroup 1		Subgroup 2		Subgroup 3		Subgroup 4		Subgroup 5						
	Marumbe	Muchina	Makarich	Muza	Sekema	Magonyo	Hlamba	Murandu	Jeffrey	Materuro	Mujibeki	Malwondo	Komboni	Gunde	Mabharani
1 Needs and Demands*															
1) Water	4	1	1	1	1	1	2	9	1	1	5	1	-	3	1
2) Road/Bridge	1/6	1	1	2	2	2	7	2	5	3	3	3	2/6	1/4	1
3) Health Care	3	3	4	4	6	10	2	1	2	2	1	2	3	2	1
4) Communication	-	-	-	-	8	-	-	-	-	-	4	-	-	-	-
5) Stock Farming **	5	4	3	3	12	5	5	3/6	3	6	-	6	4	-	-
6) Transportation	2	5	5	4	3	4	1	4	4	4	1	4	-	-	1
2 Availability of Water															
a. Domestic															
1) Very Severe	VL	1	1	1	1	2	1	3	1	1	-	VL	-	2	-
2) Severe	1	2	2	2	1	1	2	2	2	-	-	-	-	2	VL
3) Not Severe	-	3	3	VL	3	3	3	1	3	2	-	1	1	1	1
b. Farming															
1) Very Severe	VL	1	1	1	1	1	1	2	1	1	-	1	-	-	-
2) Severe	1	VL	2	VL	VL	2	2	3	2	-	-	-	-	VL	2
3) Not Severe	VL	2	VL	VL	VL	VL	-	1	-	2	-	VL	1	1	1
c. Livestock Watering															
1) Very Severe	2	1	1	1	1	2	1	2	1	1	-	1	-	-	-
2) Severe	1	VL	-	-	VL	1	2	3	2	-	-	VL	-	2	VL
3) Not Severe	-	2	-	-	VL	2	3	1	3	VL	-	VL	1	1	1
3 Use of Water															
a. River															
1) Domestic Use	1	1	VL	VL	VL	-	-	2	VL	-	-	-	-	2	VL
2) Fishing	-	-	-	-	1	-	-	-	-	VL	-	2	-	1	-
3) Farming	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4) Livestock	-	-	1	1	2	-	1	1	-	VL	-	1	VL	3	1
b. Borehole															
1) Domestic Use	-	1	-	1	-	1	1	-	1	1	1	1	1	1	1
2) Fishing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3) Farming	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4) Livestock	-	-	-	-	-	VL	-	-	-	-	-	-	-	-	-

Note: * - If the number of responses were the same number, higher ranking is shown. "4/6" denotes 4th and 6 th in ranking of the separate items listed but fall into the same category of industry.
 ** - Any industry related to cattle rearing including grazing area management, etc. are included.

表 4.4.2 パイロット地区住民のニーズとデマンド (2/2)

Figures indicate "1: First, 2: Second, 3: Third, VL: Very Low"

Item	Subgroup 1			Subgroup 2			Subgroup 3			Subgroup 4			Subgroup 5			
	Marumbé	Muchina	Makarich	Muza	Sekema	Magonyo	Hlamba	Murandu	Jeffrey	Materuro	Mujubeki	Mahvondo	Komboni	Gunde	Mabharani	
3 Use of Water (continued) c. Dug-out Well 1) Domestic Use 2) Fishing 3) Farming 4) Livestock	1	VL	1	1	1	1	-	1	1	VL	-	-	-	-	-	
4 Lack of Road 1) Very Severe 2) Severe 3) Not Severe	1	1	1	1	2	1	1	1	1	2	1	1	1	1	2	
5 Lack Bridge 1) Very Severe 2) Severe 3) Not Severe	2	1	1	1	1	1	1	1	1	1	-	1	1	1	1	
6 Lack of Transportation a. Passenger 1) Very Severe 2) Severe 3) Not Severe b. Cargo 1) Very Severe 2) Severe 3) Not Severe	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	
7 Lack of Medical Service 1) Very Severe 2) Severe 3) Not Severe	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Note: * - If the number of responses were the same number, higher ranking is shown. "4/6" denotes 4th and 6 th in ranking of the separate items listed but fall into the same category of industry.
** - Any industry related to cattle rearing including grazing area management, etc. are included.

表 4.4.3 灌漑水路送水システム比較検討案

Alternative - I System Design for day-time irrigation (for 12 hours)									
Alternative	Design Option	Length of Pipe (m)	Length of Open canal (m)	Discharge (litres/sec)	Velocity in Pipe (m/sec)	Velocity in open canal (m/sec)	Dia of pipe (m)	Section of canal (m)	Cost in Z\$ million
I - (b)	Pipeline only	4,678	-	144	0.37	-	0.7	-	35
I - (a)	Pipeline and open canal	770	4,883	144	0.37	0.53	0.7	Trapezoidal 0.5 x 0.55	10
Alternative - II System Design for Continuous Irrigation (day & night - 24 hours)									
II - (a)	Pipeline and canal with covers	770	4,883	72	0.37	0.43	0.5	Rectangular 0.5 x 0.5	11

Feasibility Considerations:

- (i) Pipe (12 hours supply)
- Very costly and investments will not commensurate with the benefits
 - Bends, sluice valves and air relief valves are not available and will have to be imported/order made
 - Heavy machinery will be required for even minor repairs
 - Pipes are feasible only where head is more and flow passes at high velocity. Here both the head and the velocity of flow are very low
- (ii) Pipe and Open canal (12 hours supply)
- Every morning the flow will have to be started about 3-4 hours before the start of irrigation time to fill the empty canals
 - Flow of water after the ending time of irrigation will not be used by the farmers and the irrigation area will get reduced
- (iii) Pipe and covered canal (24 hours supply)
- Flow will be continuous for 24 hours and farmers will have to take water in the inconvenient times also.

表 4.4.4 12時間灌漑パイプラインシステムにおける水理計算表

Discharge	0.144 Cumec	$Velocity = 4 \cdot Q / 3.1416 \cdot d^2$
Dia.of Pipe	0.7	(assuming loss in bends etc 15%)
R	0.175	Friction Loss = $1.15 \times f \cdot L/D \cdot V^2/2g$
C	140	($f = 133.7 / (C^{1.85} \cdot D^{0.167} \cdot V^{0.148})$)
Total Energy Hd	893.2	$V = 0.849C \cdot R^{0.63} \cdot I^{0.54}$
		Static Energy EL = Water El - Cumulative Friction loss
	(centre)*	Velocity head = $v^2 / 2g$
		= 893.5 - 0.3(loss from Intake to Off-take)

(*)-Theoretical to be finalised on the drawing

Particulars	R.D.	NSL	Trench level (*)	Velocity	Friction Loss	Static head(EL)	Velocity Head	Total Energy EL
Off-take	0	893.5	892	0.374	0.000	893.19	0.01	893.20
	268	894	892.5	0.374	0.103	893.09	0.01	893.10
	285	892	890.5	0.374	0.007	893.08	0.01	893.09
	460	892	890.5	0.374	0.068	893.02	0.01	893.02
	475	894	892.5	0.374	0.006	893.01	0.01	893.02
	578	892	890.5	0.374	0.040	892.97	0.01	892.98
TP-1	735	891	889.5	0.374	0.061	892.91	0.01	892.92
	840	892	890.5	0.374	0.041	892.87	0.01	892.88
TP-2	990	892	890.5	0.374	0.058	892.81	0.01	892.82
TP-3	1170	892	890.5	0.374	0.070	892.74	0.01	892.75
TP-4	1295	892	890.5	0.374	0.048	892.69	0.01	892.70
	1310	894	892.5	0.374	0.006	892.69	0.01	892.69
	1480	894	892.5	0.374	0.066	892.62	0.01	892.63
	1630	894	892.5	0.374	0.058	892.56	0.01	892.57
	1870	894	892.5	0.374	0.093	892.47	0.01	892.48
	2045	893	891.5	0.374	0.068	892.40	0.01	892.41
TP-5	2100	892.5	891	0.374	0.021	892.38	0.01	892.39
	2140	892	890.5	0.374	0.015	892.37	0.01	892.37
	2200	891	889.5	0.374	0.023	892.34	0.01	892.35
	2240	890	888.5	0.374	0.015	892.33	0.01	892.33
	2360	889	887.5	0.374	0.046	892.28	0.01	892.29
TP-6	2475	889	887.5	0.374	0.044	892.24	0.01	892.24
TP-7	2665	889	887.5	0.374	0.073	892.16	0.01	892.17
	2760		-1.5	0.374	0.037	892.13	0.01	892.13
	2785	889	887.5	0.374	0.010	892.12	0.01	892.12
	2943	890	888.5	0.374	0.061	892.06	0.01	892.06
TP-8	3073	890.8	889.3	0.374	0.050	892.01	0.01	892.01
TP-9	3273	891	889.5	0.374	0.077	891.93	0.01	891.94
	3463	890	888.5	0.374	0.073	891.86	0.01	891.86
	3568	890	888.5	0.374	0.041	891.81	0.01	891.82
	3748	890	888.5	0.374	0.070	891.75	0.01	891.75
	3818	890	888.5	0.374	0.027	891.72	0.01	891.73
TP-10	4078	889.7	888.2	0.374	0.100	891.62	0.01	891.63
	4518	889	887.5	0.374	0.170	891.45	0.01	891.46
PD	4678	888.3	886.8	0.374	0.062	891.39	0.01	891.39

表 4.4.5 12時間灌漑パイプライン及び開水路システムにおける水理計算表

Discharge 0.072 Cumec Velocity= $4 * Q / 3.1416 * d^2$
 Dia.of Pipe 0.5 (assuming loss in bends etc 15%)
 R 0.125 Friction Loss = $1.15 * f * L/D * V^2/2g$
 C 140 ($f = 133.7 / (C^{1.85} * D^{0.167} * V^{0.148})$)
 Total Energy Hd 893.2 $V = 0.849 C * R^{0.63} * f^{0.54}$
 Static Energy EL = Water EI - Cumulative Friction loss
 (centre)* Velocity head = $v^2 / 2g$
 =893.5 - 0.3(loss from Intake to Off-take)

(*)-Theoretical to be finalised on the drawing

Particulars	R.D.	NSL	Trench level(*)	Velocity	Friction Loss	Static head (EL)	Velocity Head	Total Energy EL	Remarks	
Off-take	0.0	893.5	892	0.367	0.000	893.19	0.01	893.20		
	25.0	894	892.5	0.367	0.015	893.18	0.01	893.19		
	275.0	894	892.5	0.367	0.145	893.03	0.01	893.04		
	295.0	892	890.5	0.367	0.012	893.02	0.01	893.03		
	320.0	892	890.5	0.367	0.015	893.01	0.01	893.01	Valley	
	360.0	892	890.5	0.367	0.023	892.98	0.01	892.99		
	375.0	892	890.5	0.367	0.009	892.98	0.01	892.98		
	417.0	894	892.5	0.367	0.024	892.95	0.01	892.96		
	435.0	892	890.5	0.367	0.010	892.94	0.01	892.95	Valley	
	470.0	892	890.5	0.367	0.020	892.92	0.01	892.93		
	485.0	894	892.5	0.367	0.009	892.91	0.01	892.92		
	515.0	895	893.5	0.367	0.017	892.89	0.01	892.90		
	575.0	894	892.5	0.367	0.035	892.86	0.01	892.87		
	625.0	892	890.5	0.367	0.029	892.83	0.01	892.84		
	770.0	892	890.5	0.367	0.084	892.75	0.01	892.75		
					0.447					
Particulars/strs	R.D.	metres	Inbetween distance (on map 1:5000) (1cm=50m) cm	Ground level (NSL)mts	Head Loss in structures/working head	Length of main canal	S-slope	Loss of head through slope	Proposed FSL u/s	Proposed FSL d/s
Off-take	770.0		0.30	892.0	0.10	15	0.0005556	0.0083333	892.50	892.40
P.Flume	785.0		6.20	892.0	0.20	310	0.0005556	0.1722222	892.39	892.19
TP-1	1095.0		1.70	892.0		85	0.0005556	0.0472222	892.02	892.02
TP-2	1180.0		2.40	892.0		120	0.0005556	0.0666667	891.97	891.97
TP-3	1300.0		5.80	892.0		290	0.0005556	0.1611111	891.91	891.91
Xing-1	1590.0		4.50	893.8	0.05	225	0.0005556	0.125	891.74	891.69
Xing-2	1815.0		6.80	894.0	0.05	340	0.0005556	0.1888889	891.57	891.52
TP-4	2155.0		4.00	892.3		200	0.0005556	0.1111111	891.33	891.33
Xing-3	2355.0		6.60	890.8	0.05	330	0.0005556	0.1833333	891.22	891.17
TP-5	2685.0		1.60	890.3		80	0.0005556	0.0444444	890.99	890.99
Xing-4	2765.0		4.30	890.5	0.05	215	0.0005556	0.1194444	890.94	890.89
Xing-5	2980.0		0.46	891.3	0.05	23	0.0005556	0.0127778	890.77	890.72
TP-6	3003.0		0.80	890.6		40	0.0005556	0.0222222	890.71	890.71
Drx.Xg-1	3043.0		3.50	889.0		175	0.0005556	0.0972222	890.69	890.69
TP-7	3218.0		2.30	890.0		115	0.0005556	0.0638889	890.59	890.59
Drx.Xg-2	3333.0		1.80	889.0		90	0.0005556	0.05	890.53	890.53
Xing-6	3423.0		6.00	890.0	0.05	300	0.0005556	0.1666667	890.48	890.43
TP-8	3723.0		2.50	890.5		125	0.0005556	0.0694444	890.26	890.26
Xing-7	3848.0		4.20	890.5	0.05	210	0.0005556	0.1166667	890.19	890.14
TP-9	4058.0		4.30	890.3		215	0.0005556	0.1194444	890.02	890.02
TP-10&X8	4273.0		10.70	890.0	0.05	535	0.0005556	0.2972222	889.90	889.85
Xing-9	4808.0		10.80	889.8	0.05	540	0.0005556	0.3	889.56	889.51
Xing-10	5348.0		3.90	889.1	0.05	195	0.0005556	0.1083333	889.21	889.16
TP-11	5543.0		2.20	888.5		110	0.0005556	0.0611111	889.05	889.05
PD	5653.0			888.0	0.20		0.0005556	0	888.99	888.79
					1.00			2.7127778		

表 4.4.6 24時間灌漑パイプライン及び開水路システムにおける水理計算表

Discharge 0.072 Cumec Velocity = $4 \cdot Q / 3.1416 \cdot d^2$
 Dia. of Pipe 0.5 (assuming loss in bends etc 15%)
 R 0.125 Friction Loss = $1.15 \cdot f \cdot L / D \cdot V^2 / 2g$
 C 130 ($f = 133.7 / (C^{1.85} \cdot D^{0.167} \cdot V^{0.148})$)
 Total Energy Hd 893.2 $V = 0.849 C \cdot R^{0.63} \cdot I^{0.54}$
 Min. W. El 893.5 Static Energy EL = Water El - Cumulative Friction loss
 (centre)* Velocity head = $v^2 / 2g$
 = 893.5 - 0.3(loss from Intake to Off-take)

(*)-Theoretical to be finalised on the drawing

Particulars	R.D.	NSL	Trench level(*)	Velocity	Friction Loss	Static head (EL)	Velocity Head	Total Energy EL	Remarks
Off-take	0.0	893.5	892	0.367	0.000	893.19	0.007	893.20	
	25.0	894	892.5	0.367	0.010	893.18	0.007	893.19	
	275.0	894	892.5	0.367	0.007	893.09	0.007	893.09	
	295.0	892	890.5	0.367	0.008	893.08	0.007	893.09	
	320.0	892	890.5	0.367	0.010	893.07	0.007	893.08	Valley
	360.0	892	890.5	0.367	0.016	893.05	0.007	893.06	
	375.0	892	890.5	0.367	0.006	893.05	0.007	893.05	
	417.0	894	892.5	0.367	0.016	893.03	0.007	893.04	
	435.0	892	890.5	0.367	0.007	893.02	0.007	893.03	Valley
	470.0	892	890.5	0.367	0.014	893.01	0.007	893.02	
	485.0	894	892.5	0.367	0.006	893.01	0.007	893.01	
	515.0	895	893.5	0.367	0.012	892.99	0.007	893.00	
	575.0	894	892.5	0.367	0.023	892.97	0.007	892.98	
	625.0	892	890.5	0.367	0.019	892.95	0.007	892.96	
	770.0	892	890.5	0.367	0.056	892.89	0.007	892.90	
				Total Loss	0.299				
Particulars/strs	R.D.	Inbetween distance (on map 1:5000) (1cm=50m) m	Ground level (NSL)mts	Head Loss in structures/working head	Length of main canal	S-slope	Loss of head through slope	Proposed FSL u/s	Proposed FSL d/s
Off-take	770.0	0.30	892.0	0.10	15	0.0007	0.0111	892.89	892.79
P.Flume	785.0	6.20	892.0	0.20	310	0.0007	0.2299	892.78	892.58
TP-1	1095.0	1.70	892.0		85	0.0007	0.0630	892.35	892.35
TP-2	1180.0	2.40	892.0		120	0.0007	0.0890	892.29	892.29
TP-3	1300.0	5.80	892.0		290	0.0007	0.2151	892.20	892.20
Xing-1	1590.0	4.50	893.8		225	0.0007	0.1669	891.99	891.99
Xing-2	1815.0	6.80	894.0		340	0.0007	0.2522	891.82	891.82
TP-4	2155.0	4.00	892.3		200	0.0007	0.1483	891.57	891.57
Xing-3	2355.0	6.60	890.8		330	0.0007	0.2447	891.42	891.42
TP-5	2685.0	1.60	890.3		80	0.0007	0.0593	891.17	891.17
Xing-4	2765.0	4.30	890.5		215	0.0007	0.1595	891.11	891.11
Xing-5	2980.0	0.46	891.3		23	0.0007	0.0171	890.96	890.96
TP-6	3003.0	0.80	890.6		40	0.0007	0.0297	890.94	890.94
Drg.Xg-1	3043.0	3.50	889.0		175	0.0007	0.1298	890.91	890.91
TP-7	3218.0	2.30	890.0		115	0.0007	0.0853	890.78	890.78
Drg.Xg-2	3333.0	1.80	889.0		90	0.0007	0.0667	890.69	890.69
Xing-6	3423.0	6.00	890.0		300	0.0007	0.2225	890.63	890.63
TP-8	3723.0	2.50	890.5		125	0.0007	0.0927	890.40	890.40
Xing-7	3848.0	4.20	890.5		210	0.0007	0.1557	890.31	890.31
TP-9	4058.0	4.30	890.3		215	0.0007	0.1595	890.16	890.16
TP-10&X8	4273.0	10.70	890.0		535	0.0007	0.3968	890.00	890.00
Xing-9	4808.0	10.80	889.8		540	0.0007	0.4005	889.60	889.60
Xing-10	5348.0	3.90	889.1		195	0.0007	0.1446	889.20	889.20
TP-11	5543.0	2.20	888.5		110	0.0007	0.0816	889.05	889.05
PD	5653.0		888.0	0.20		0.0007	0.0000	888.97	888.77
				0.50			3.6216		

表 4.4.7 組織強化プログラムの概要 - 1/3

Program	Program Description/Objectives	Location or Target Area / Group	Program Components	Implementation Agency
I. Strengthening of Rural Institutions				
I-1. AGRITEK				
1. Establishment of Agricultural Extension Center (AEC)	<ul style="list-style-type: none"> - Establishment of AEC in & around the irrigated area - To establish a nucleus place for agricultural extension, especially for irrigated agriculture - To establish an office/place to accommodate all the field extension officers in the Project Area to make possible their integrated approach for 	In or around irrigated area	AEC Building (150 m ²) (3 office rooms, 1 class room & 1 store) Generator & electricity supply (1 set) 4 wheel vehicle (1 unit) Training equipment Office facilities & equipment	AGRITEX / Project Office
2. Logistic Support Strengthening	<ul style="list-style-type: none"> - Provision of motorcycles to FAEOs & 4 wheel vehicle to District Office - To enhance capability of FAEOs in the Project Area & to strengthening technical guidance to FAEOs from district or provincial AGRITEX 	<ul style="list-style-type: none"> - 4 FAEOs in Project Area - (1 newly recruited staff) - AGRITEX District Office 	Motorcycle (4 units) 4 wheel vehicle (1 unit)	AGRITEX
3. Capacity Building of Field Extension Staff	<ul style="list-style-type: none"> - Periodical in-service training of FAEOs at province level - To improve capability of FAEOs through in-service training 	<ul style="list-style-type: none"> - 4 FAEOs in Project Area - (1 newly recruited staff) 	In-service Training Course (5 days)	AGRITEX
4. Recruitment of FAEO	<ul style="list-style-type: none"> - To post a FAEO well experienced in irrigated agriculture, water management & high value crops - To meet farmers demand for technical guidance & training on irrigated agriculture 	<ul style="list-style-type: none"> - 1 FAEO 	Remuneration/allowances/year	AGRITEX
5. Strengthening of Technical Guidance of Provincial Staff	<ul style="list-style-type: none"> - Periodical visit of provincial staff to the Project Area for delivering technical guidance to FAEOs 	<ul style="list-style-type: none"> - Provincial staff (SMS) 		AGRITEX
I-2. VET				
1. Logistic Support Strengthening	<ul style="list-style-type: none"> - Provision of motorcycles to VEA & AHI & 4 wheel vehicle to District Office - To enhance field operation capability of an extension staff (VEA) & Animal Health Inspector (AHI) in the Project Area and to strengthening technical guidance and support from the district VET to meet requirements rising from the livestock development plans 	<ul style="list-style-type: none"> - VEA & AHI - VET District Office 	Motorcycle (2 units) 4 wheel vehicle (1 unit)	VET

Source: Program costs estimated based on current costs for similar programs implemented by AGRITEX

表 4.4.7 組織強化プログラムの概要 - 2/3

Program	Program Description/Objectives	Location or Target Area / Target Group	Program Components	Implementation Agency
I. Strengthening of Rural Institutions				
1-2. VET - continued				
2. Capacity Building of Field Extension Staff	<ul style="list-style-type: none"> - Periodical in-service training of VET & AHI at province level - To improve capability of VET & AHI through in-service training 	- 1 VEA & 1 AHI	In-service Training Course (5 days)	VET
I-3. Pilot Project Area Community (VIDCOs & Village Assemblies)				
1. Awareness Program	<ul style="list-style-type: none"> - Awareness raising of villagers in Project Area through Public Hearings at the project Village Assemblies - Consultation meeting with influential people in the Area to complement the public hearings - Participatory workshop of selected participants - To aim at mobilization of the communities through raising awareness of Village Assemblies organized by all the villagers above 18 years of age - To aim at activation of the Assemblies 	<ul style="list-style-type: none"> - 15 Village Assemblies - Influential people - Selected participants 	<ul style="list-style-type: none"> Public hearings (1 day) Consultation meeting (half day) Workshop (1 day) 	AGRITEX/ Project Office/ NGOs
2. Capacity Building of VIDCOs	<ul style="list-style-type: none"> - Capacity building of VIDCOs through: - Capacity building training of representatives of project related VIDCOs - Mass guidance to all members of VIDCOs - Workshop of representatives of VIDCOs - Study tour of representatives of VIDCOs - To enhance of technical & managerial capacity of VIDCOs so that they will be established as planning, implementation & management institutions for rural development at village level - Formation & establishment of the PMC through: - Public hearings at Village Assembly level - Formation guidance to representatives of Village Assemblies & VIDCOs - "Learning by Doing" under Project Office support - Study tour of representatives of the PMC - To support formation & establishment of the PMC that is responsible for implementation, management & sustainability of the Project 	<ul style="list-style-type: none"> - 15 VIDCOs' members - VIDCOs' representatives 	<ul style="list-style-type: none"> Capacity building training (3 days) Mass guidance (1 day) Workshop (1 day) Study tour (1 day) 	AGRITEX/ Project Office/ NGOs
3. Formation of Project Management Committee (PMC)				
		<ul style="list-style-type: none"> - Village Assemblies - VIDCOs' representatives 	<ul style="list-style-type: none"> Public hearing (1 day) Formation guidance Workshop (1 day) Study tour (1 day) 	AGRITEX/ Project Office/ NGOs

Source: Program costs estimated based on current costs for similar programs implemented by AGRITEX

表 4.4.7 組織強化プログラムの概要 - 3/3

Program	Program Description/Objectives	Location or Target Area / Target Group	Program Components	Implementation Agency
I. Strengthening of Rural Institutions I-3. Pilot Project Area Community (VIDCOs & Village Assemblies) - continued	<ul style="list-style-type: none"> - Establishment of multipurpose community development center - To establish a multipurpose center to accommodate office space for Project Office & PMC, a multipurpose meeting hall, a lecture 	Nyarupakwe BC	<ul style="list-style-type: none"> Center building (300 m²) Generator & electricity supply Office facilities & equipment Training equipment Motorcycle Bicycle 	Project Office/ RDC
II. Strengthening of Farmers Organizations				
1. Formation of WUG & IMC	<ul style="list-style-type: none"> - Supporting formation of WUG & IMC through Awareness program - WUG/IMC formation guidance - Workshops for formation of WUG/IMC - "Learning by Doing" under Project Office support - Study tour of representatives of the WUG - To support formation and establishment of WUG and IMC in the irrigated area responsible for the implementation, O&M and sustainability of 	Beneficiary groups of irrigation development	<ul style="list-style-type: none"> Awareness program WUG/IMC formation guidance Workshop (1 day) Study tour 	AGRITEX/ Project Office
2. Strengthening / Formation of Farmers Organizations of Beneficiaries of Livestock Development Plans	<ul style="list-style-type: none"> - Supporting strengthening/formation of farmers organizations of livestock development - Grazing Area Develop.(strengthening) - Livestock Water Development Scheme(strengthening) - Fishery Development Scheme (formation) 	Beneficiary groups of livestock development plan	<ul style="list-style-type: none"> Awareness program Farmer to farmer guidance Strengthening guidance (1 day) Formation guidance Workshop (1 day) 	AGRITEX/ Project Office
3. Awareness Program at Village Level	<ul style="list-style-type: none"> - Awareness program for formation/establishment of farmers organizations - To support formation and establishment of farmers organizations in the Project Area such as producers group, marketing group, lending group, input purchasing group, women group, youth 	Village Assemblies members & youth	Awareness program	PIU / AGRITEX
4. Strengthening / Formation of Farmers Organizations	<ul style="list-style-type: none"> - Guidance/support on strengthening/formation of farmers organizations by extension staff & Project Office - To support formation and establishment of farmers organizations in the Project Area such as producers group, marketing group, lending group, input purchasing group, women group, youth 	Village Assemblies members & youth	To be implemented through routine services provided by extension staff	PIU / AGRITEX

Source: Program costs estimated based on current costs for similar programs implemented by AGRITEX

表 4.4.8 農業支援サ―ビス強化プログラムの概要 - 1/2

Program	Program Descriptions	Target Area / Group & Components	Location or Agency
I. Strengthening of Agricultural Extension Services			
1. Field Programs: Crop Production 1) Demonstrations cum Trials Field crops: 1.0 ha Vegetables: 0.5 ha	<ul style="list-style-type: none"> - Adaptability tests, technology development & technology transfer - Demonstration cum trials on: <ul style="list-style-type: none"> - New crops & variety - Recommended practices, fertilization, pre planting - Irrigation method & water management - Training & periodical guidance by a FAEO experienced in irrigated agriculture to all farmer groups in irrigated area on water management, 	<ul style="list-style-type: none"> Primarily irrigated area & its beneficiaries - Demonstrations cum trials (1.0 ha) - Demonstrations cum trials (0.5 ha) - Water management (5 ha) 	AGRITEX
2) Training cum Field Guidance	<ul style="list-style-type: none"> - Training & periodical guidance by a FAEO experienced in irrigated agriculture to all farmer groups in irrigated area on water management, 	<ul style="list-style-type: none"> Farmer groups in irrigated area - Farmer training (3 days): 2 times - Supervision: 3 times - Field operation by FAEO(season) 	AGRITEX
2. Field Programs: Livestock 1) Demonstrations	<ul style="list-style-type: none"> - Demonstration on improved technologies on animal husbandry - Demonstration on: <ul style="list-style-type: none"> - Beef fattening (15 heads/unit) - Pasture & veld establishment (1 ha/unit) - Agro-forestry Development (2 ha) 	<ul style="list-style-type: none"> Selected farmers groups in the Project Area <i>Beef fattening</i> <ul style="list-style-type: none"> - Feed - Veterinary Treatment - Guidance/training <i>Pasture & veld establishment</i> <ul style="list-style-type: none"> - Land preparation - Fertilization - Seeds/runners - Guidance/training 	AGRITEX
3. Farmer Training Programs: Crop 1) Agronomy	<ul style="list-style-type: none"> - Farmer training course on special subjects on crop production on need & demand basis; (1 day/4 hours; 25 farmers/course) - Recommended practices, pest control, chemical use, farm mechanization etc. 	<ul style="list-style-type: none"> Selected farmers groups in the Project Area <i>Agro-forestry Development</i> <ul style="list-style-type: none"> - Establishment - Guidance/training 	AGRITEX
4. Farmer Training Programs: Livestock 1) Animal Husbandry	<ul style="list-style-type: none"> - Farmer training course on special subjects on animal husbandry on need & demand basis; (1 day/4 hours; 25 farmers/course) - Herd management, herd health program, veld & pasture management, animal nutrition 	<ul style="list-style-type: none"> Selected farmers groups in the Project Area 	AGRITEX

Source: Program costs estimated based on current costs for similar programs implemented by AGRITEX

表 4.4.8 農業支援サービス強化プログラムの概要 - 2/2

Program	Program Descriptions	Target Area / Group & Components	Location or Agency
I. Strengthening of Agricultural Extension Services - continued			
4. Farmer Training Programs: Livestock - continued	- Farmer training course on special subjects on animal health on need & demand basis; (1 day/4 hours; 25 farmers/course) - Herd health program, genetic improvement	Selected farmers groups in the Project Area	VET
2) Animal Health			
5. Farmer Training Programs: Organization & Others	- Farmer training course on organizational aspects; (3 days (12 hours); 25 farmers/course) - Leadership course, group dynamics, formation of group/organization etc.	Selected farmers groups in the Project Area	AGRITEX
1) Organization			
2) Farm Management	- Farmer training course on farm management; (3 days (12 hours); 25 farmers/course) - Record keeping, marketing, financial planning & management etc.	Selected farmers groups in the Project Area	AGRITEX
3) Study Tour	- Study tour to advanced irrigation scheme, farming areas & livestock areas, marketing facilities etc. (1 day; 25 farmers/tour)	Selected farmers groups in the Project Area	AGRITEX
6. Workshop	- Workshop for seasonal evaluation & annual program planning - Workshop for innovation dissemination (1 day; 50 farmers/workshop)	FAEOs Representatives of farmers groups Selected farmers in the Project Area	AGRITEX / PMC
7. Field Guidance on Formation / Establishment of Farmers Organizations	- Strengthening of field guidance & support on formation or strengthening of farmers - Strengthening of guidance/support on group activities	Farmer groups in the Project Area	AGRITEX / Project Office
8. Guidance & Support of Senior Staff	- Periodical visits of senior staff for strengthening guidance & support to field staff (1 day by provincial SMS)	FAEOs Representatives of farmer groups	AGRITEX
II. Improvement of Marketing System			
1. Development of Open Market	- Construction of an open market Marketplace, loading bay & market facilities	Nyarupakwe BC - Market stalls (4 stalls) - Loading bay (1 unit) - Water & electricity supply facility(1 set) - Drain & waste disposal (1 set) - Toilet, fence (1 set)	RDC

Source: Program costs estimated based on current costs for similar programs implemented by AGRITEX

表 4.5.1 ニヤルパクウェ・パイロット・プロジェクト事業内容一覧表

Work Item	Description	Work Item	Description
I. Water Resources Development		IV. Rural Infrastructure Improvement	
(1) Nyarupakwe Dam		(1) Rural Road Improvement	
(a) Dam Type	Combined Type of Concrete Gravity Dam and Fill Dam	(a) Nyarupakwe to Gokwe Road (km)	24
(b) Dam Height (m)	15.5	(b) Farm to Market Link Road (km)	22
(c) Dam Crest Length		(2) Borehole Improvement	
- Concrete Dam Portion (m)	226.0	(a) Rehabilitation (nos.)	13
- Fill Dam Portion (m)	356.0	(b) New Construction (nos.)	6
(d) Dam Crest Width (m)	8.0	(3) Community Development Center (place)	1
(e) Concrete Volume (m ³)	29,500		
(f) Embankment Volume (m ³)	87,500	V. Institutional Strengthening	
(g) Spillway		(1) Agricultural Extension Center (place)	1
- Design Flood Discharge (m ³ /s)	400	(2) Institutional Strengthening Program	L.S
- Type	Ungated Ogee Type at Concrete Dam Portion		
(h) Intake Discharge (m ³ /s)	0.074	VI. Agricultural Support Services Strengthening	
(2) Upstream Small Scale Dam		(1) Agricultural Support Services Program	L.S
(a) Dam Type	Concrete Gravity Dam	(2) Open Market (unit)	1
(b) Dam Height (m)	7.2		
(c) Dam Crest Length (m)	61.0		
(d) Dam Crest Width (m)	2.0		
(e) Concrete Volume (m ³)	1,120		
(f) Overflow Section	W20m x H1m at the Center of Dam Wall		
II. Irrigation Development			
(1) Irrigation Area (ha)	60		
(2) Main Irrigation Canal			
(a) Design Discharge (l/s)	72		
(b) Canal Length			
- Pipeline, Dia.=500mm (m)	770		
- Open Canal (m)	4,883		
(3) On-farm Facilities	L.S		
(Tertiary canals, Watercourses, Farm Drains and Farm Roads)			
III. Livestock Development			
(1) Fully Fenced Grazing Area (ha)	860		
(2) Water Trough (nos.)	2		
(3) Fish Farming in the Nyarupakwe Reservoir (ha)	20		

表 4.5.2 パイロット事業費

Work Item	Work Q'ty		Amount(1,000Z\$)	Remarks
I. Water Resources Development				
1. Nyarupakwe Dam				
(a) Excavation	145,700	m ³	14,570	
(b) Embankment	87,500	m ³	8,050	
(c) Concrete	29,500	m ³	75,225	
(d) Form	5,900	m ²	3,245	
(e) Steel Bar	200	ton	4,000	
(f) Others		L.S	10,509	Σ(a-e)x10%
2. Small Scale Dam				
(a) Excavation	1,100	m ³	110	
(b) Concrete	1,120	m ³	2,856	
(c) Others		L.S	297	Σ(a-b)x10%
(Sub-total)			(118,862)	
II. Irrigation Development				
1. Main Irrigation Canal System				
(a) Excavation	17,300	m ³	1,211	
(b) Embankment	2,400	m ³	187	
(c) Concrete	800	m ³	3,104	
(d) Concrete Pipe	850	m	1,207	
(e) Form	1,710	m ²	941	
(f) Water Stop	2,300	m	1,426	
(g) Gate	4	nos.	1,170	
(g) Others		L.S	925	Σ(a-f)x10%
2. On-farm Facilities	60	ha	1,140	
(Sub-total)			(11,310)	
III. Livestock Development				
1. Grazing Area Development Scheme	860	ha	580	
2. Livestock Water Development Scheme	2	unit	40	
3. Fishery Development Scheme		L.S	55	
(Sub-total)			(675)	
IV. Rural Infrastructure Development				
1. Nyarupakwe-Gokwe Road Improvement	24	km	36,480	
2. Link Roads Improvement	22	km	8,360	
3. Improvement of Boreholes	4	nos.	1,520	
4. Construction of Boreholes	15	nos.	11,400	
5. Construction of Community Center		L.S	5,890	
(Sub-total)			(63,650)	
V. Institutional Strengthening				
1. Agricultural Extension Center	1	unit	3,800	
2. Institutional Strengthening Program		L.S	3,574	
(Sub-total)			(7,374)	
VI. Agricultural Support Services				
1. Agricultural Extension Services		L.S	1,047	
2. Development of Open Market	1	unit	760	
(Sub-total)			(1,807)	
VI. Engineering Services			(30,552)	Σ(I-VI)x15%
VII. Contingencies			(23,423)	Σ(I-VII)x10%
Grand Total			257,653	

表 4.6.1 作物收支

(At Financial Prices)

Crops	(Total Area 60 ha)																				
	Without Project Conditions					With Project Conditions															
	Share to total area (a)	Cropped area (ha) (b)	Yield ton/ha (c)	Total prod. (d)=(b)*(c)	Price Z\$/kg (e)	Total amount (f)=(d)*(e)	Share to total area (a)	Cropped area (ha) (b)	Yield ton/ha (c)	Total Prod. amount (f)=(d)*(e)	Price Z\$/kg (e)	Total Prod. cost (g)=(b)*(e)	Share to total area (a)	Cropped area (ha) (b)	Yield ton/ha (c)	Total Prod. amount (f)=(d)*(e)	Price Z\$/kg (e)	Total Prod. cost (g)=(b)*(e)	Net return (i)=(f)-(h)	Incremental net return (j)=(i)-(l)	
1 COTTON	0.63	37.86	1.29	48.84	14.90	727.707	0.70	42.00	2.50	1,564,500	14.982	629,244	0.70	42.00	2.50	1,564,500	14.982	629,244	935,256	462,422	
2 MAIZE	0.26	15.36	1.01	15.51	6.40	99.287	0.18	10.80	6.00	414,720	16,042	173,254	0.18	10.80	6.00	414,720	16,042	173,254	241,466	215,431	
3 WHEAT	0.00	0.00	0.00	0.00	7.60	0	0.63	37.80	4.20	1,208,576	19,274	690,757	0.63	37.80	4.20	1,208,576	19,274	690,757	515,819	515,819	
4 GROUNDNUTS	0.11	6.78	1.07	7.25	10.00	72,546	0.05	3.00	2.50	75,000	14,779	44,337	0.05	3.00	2.50	75,000	14,779	44,337	30,663	9,964	
5 CABBAGE	0.00	0.00	0.00	0.00	3.00	0	0.035	2.10	50.00	315,000	58,053	121,911	0.035	2.10	50.00	315,000	58,053	121,911	193,089	193,089	
6 TOMATOES	0.00	0.00	0.00	0.00	3.80	0	0.035	2.10	75.00	598,500	78,191	164,201	0.035	2.10	75.00	598,500	78,191	164,201	434,299	434,299	
7 BABY CORN	0.00	0.00	0.00	0.00	60.00	0	0.035	2.10	1.00	126,000	31,517	66,186	0.035	2.10	1.00	126,000	31,517	66,186	59,814	59,814	
8 PAPRIKA	0.00	0.00	0.00	0.00	30.00	0	0.035	2.10	3.00	189,000	50,161	105,338	0.035	2.10	3.00	189,000	50,161	105,338	83,662	83,662	
Total	1.00	60.00	-	-	-	899,540	1.70	102.00	-	4,489,296	-	379,972	519,568	1.70	102.00	-	4,489,296	-	1,995,228	2,494,068	1,974,500

Incremental Net Return	41,568
Per ha Z\$	32,908

(At Economic Prices)

Crops	(Total Area 60 ha)																						
	Without Project Conditions					With Project Conditions																	
	Share to total area (a)	Cropped Area (ha) (b)	Yield ton/ha (c)	Total Prod. amount (f)=(d)*(e)	Price Z\$/kg (e)	Share to total area (a)	Cropped area (ha) (b)	Yield ton/ha (c)	Total Prod. amount (f)=(d)*(e)	Price Z\$/kg (e)	Total Prod. cost (g)=(b)*(e)	Share to total area (a)	Cropped area (ha) (b)	Yield ton/ha (c)	Total Prod. cost (g)=(b)*(e)	Share to total area (a)	Cropped area (ha) (b)	Yield ton/ha (c)	Total Prod. amount (f)=(d)*(e)	Price Z\$/kg (e)	Total Prod. cost (g)=(b)*(e)	Net return (i)=(f)-(h)	Incremental net return (j)=(i)-(l)
1 COTTON	0.63	37.8	1.29	48,762	17.4	848,459	0.7	42.00	2.5	1,827,000	9,784	410,928	0.7	42.00	2.5	1,827,000	9,784	410,928	1,416,072	17.4	410,928	1,416,072	713,294
2 MAIZE	0.26	15.6	1.01	15,756	7.5	118,170	0.18	10.80	6	486,000	11,439	123,541	0.18	10.80	6	486,000	11,439	123,541	362,459	7.5	123,541	362,459	286,763
3 WHEAT	0	0	0	0	9.3	0	0.63	37.80	4.2	1,476,468	12,844	485,503	0.63	37.80	4.2	1,476,468	12,844	485,503	990,965	9.3	485,503	990,965	990,965
4 GROUNDNUTS	0.11	6.8	1.07	7,082	9.3	65,677	0.05	3.00	2.5	69,750	9,567	28,701	0.05	3.00	2.5	69,750	9,567	28,701	41,049	9.3	28,701	41,049	3,304
5 CABBAGE	0	0	0	0	2.8	0	0.035	2.10	50	294,000	40,104	206,782	0.035	2.10	50	294,000	40,104	206,782	206,782	2.8	206,782	206,782	206,782
6 TOMATOES	0	0	0	0	3.5	0	0.035	2.10	75	551,250	55,481	116,510	0.035	2.10	75	551,250	55,481	116,510	434,740	3.5	116,510	434,740	434,740
7 BABY CORN	0	0	0	0	55.8	0	0.035	2.10	1	117,180	23,764	49,904	0.035	2.10	1	117,180	23,764	49,904	67,276	55.8	49,904	67,276	67,276
8 PAPRIKA	0	0	0	0	27.9	0	0.035	2.10	3	175,770	38,109	80,029	0.035	2.10	3	175,770	38,109	80,029	95,741	27.9	80,029	95,741	95,741
Total	1.01	60.0	-	-	-	1,032,305	1.70	102.00	-	4,997,416	-	218,107	816,199	1.70	102.00	-	4,997,416	-	1,378,335	3,618,083	2,801,884	2,801,884	

Incremental Net Return	60,301
Per ha Z\$	46,698

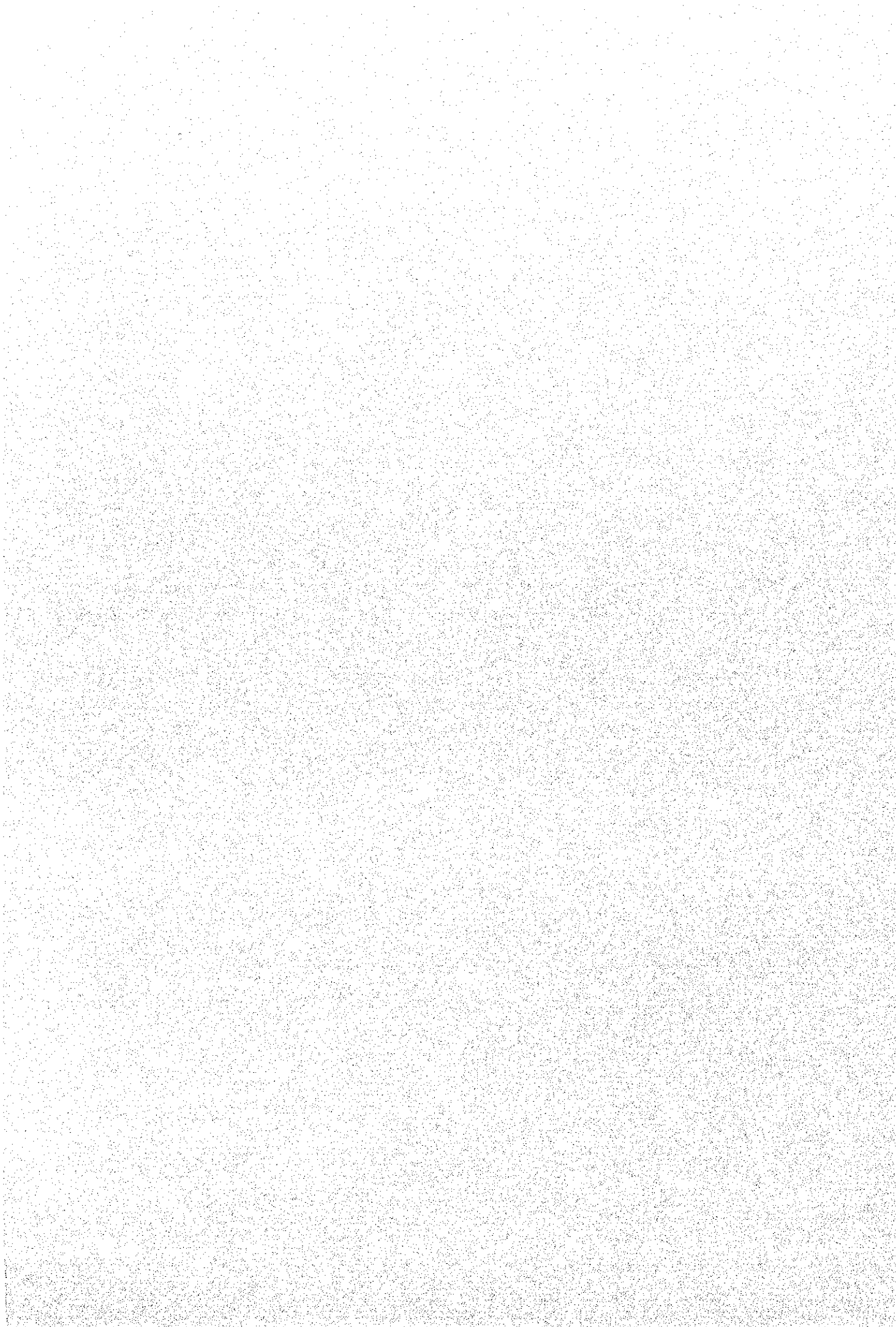
表 4.6.2 経済費用及び便益フロー

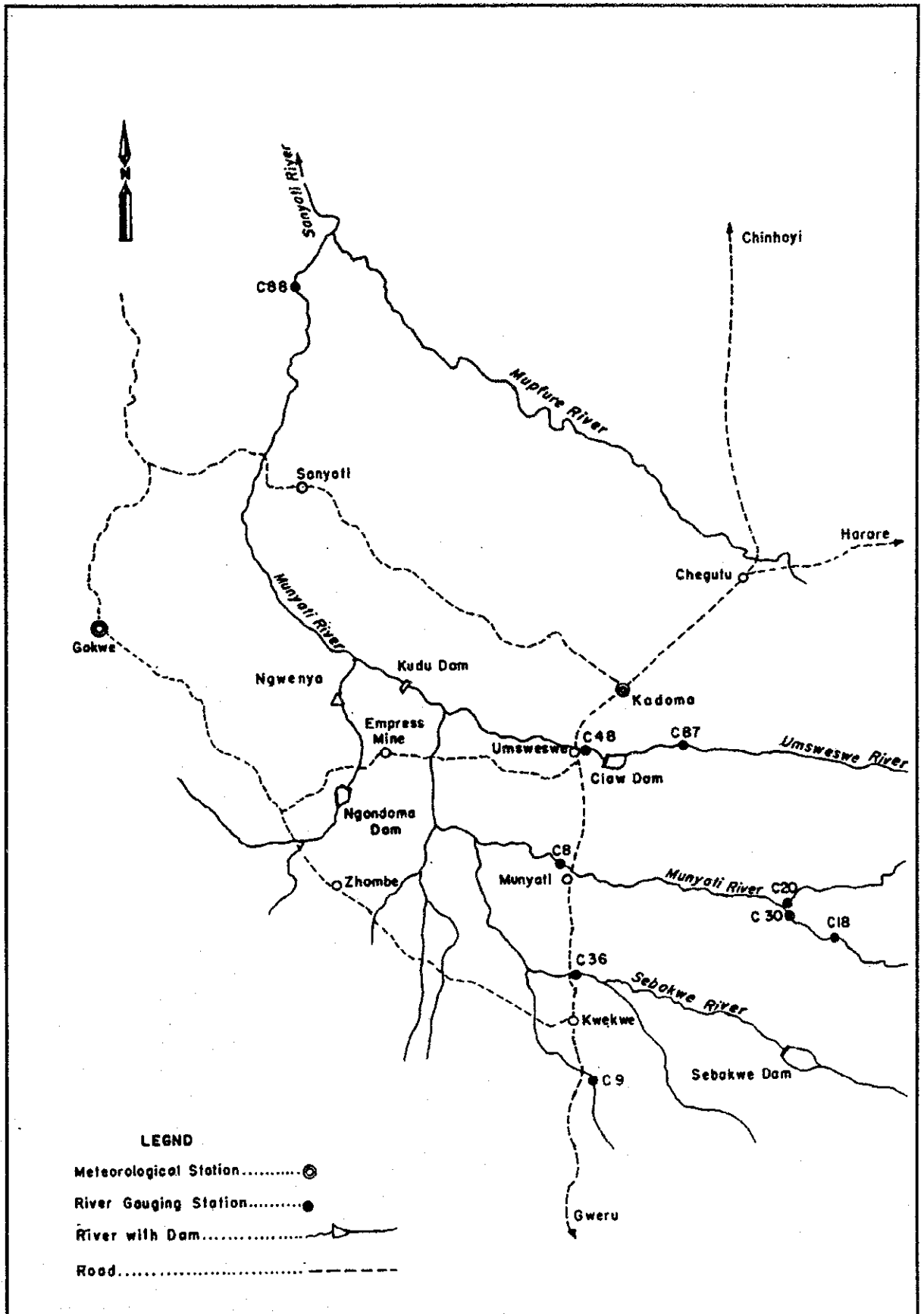
(Unit:Z\$ 1000.0)

Year in Order	Year	Cost Stream				Benefit Stream	Net Benefit	Present Worth Value	
		Capital Cost	O&M	Replacement	Total			Discount Rate 10%	
								Cost	Benefit
1	2001	21498			21498	0	-21498	19544	0
2	2002	56890			56890	0	-56890	47017	0
3	2003	125270			125270	0	-125270	94117	0
4	2004	1232	2102		3334	6902	3568	2277	4714
5	2005	1232	2102		3334	7490	4156	2070	4651
6	2006		2102		2102	7968	5866	1187	4498
7	2007		2102		2102	8561	6459	1079	4393
8	2008		2102		2102	44070	41968	981	20559
9	2009		2102		2102	88099	85997	891	37363
10	2010		2102		2102	132147	130045	810	50948
11	2011		2102		2102	176177	174075	737	61749
12	2012		2102		2102	220225	218123	670	70170
13	2013		2102		2102	264255	262153	609	76545
14	2014		2102		2102	308302	306200	554	81186
15	2015		2102	1752	3854	352350	348496	923	84350
16	2016		2102		2102	293920	291818	457	63966
17	2017		2102		2102	234910	232808	416	46476
18	2018		2102		2102	176180	174078	378	31688
19	2019		2102		2102	117469	115367	344	19207
20	2020		2102		2102	58740	56638	312	8731
21	2021		0		0	0	0	0	0
22	2022		0		0	0	0	0	0
23	2023		0		0	0	0	0	0
24	2024		0		0	0	0	0	0
25	2025		0		0	0	0	0	0
26	2026		0		0	0	0	0	0
27	2027		0		0	0	0	0	0
28	2028		0		0	0	0	0	0
29	2029		0		0	0	0	0	0
30	2030		0		0	0	0	0	0
31	2031		0		0	0	0	0	0
32	2032		0		0	0	0	0	0
33	2033		0		0	0	0	0	0
34	2034		0		0	0	0	0	0
35	2035		0		0	0	0	0	0
36	2036		0		0	0	0	0	0
37	2037		0		0	0	0	0	0
38	2038		0		0	0	0	0	0
39	2039		0		0	0	0	0	0
40	2040		0		0	0	0	0	0
41	2041		0		0	0	0	0	0
42	2042		0		0	0	0	0	0
43	2043		0		0	0	0	0	0
44	2044		0		0	0	0	0	0
45	2045		0		0	0	0	0	0
46	2046		0		0	0	0	0	0
47	2047		0		0	0	0	0	0
48	2048		0		0	0	0	0	0
49	2049		0		0	0	0	0	0
50	2050		0		0	0	0	0	0
		206122	35734	1752	243608	2497765	2254157	175371	671193

EIRR 26.0%
 B/C 3.83 (Discount Rate10%)
 B-C 495822 (Discount Rate10%)

付 図



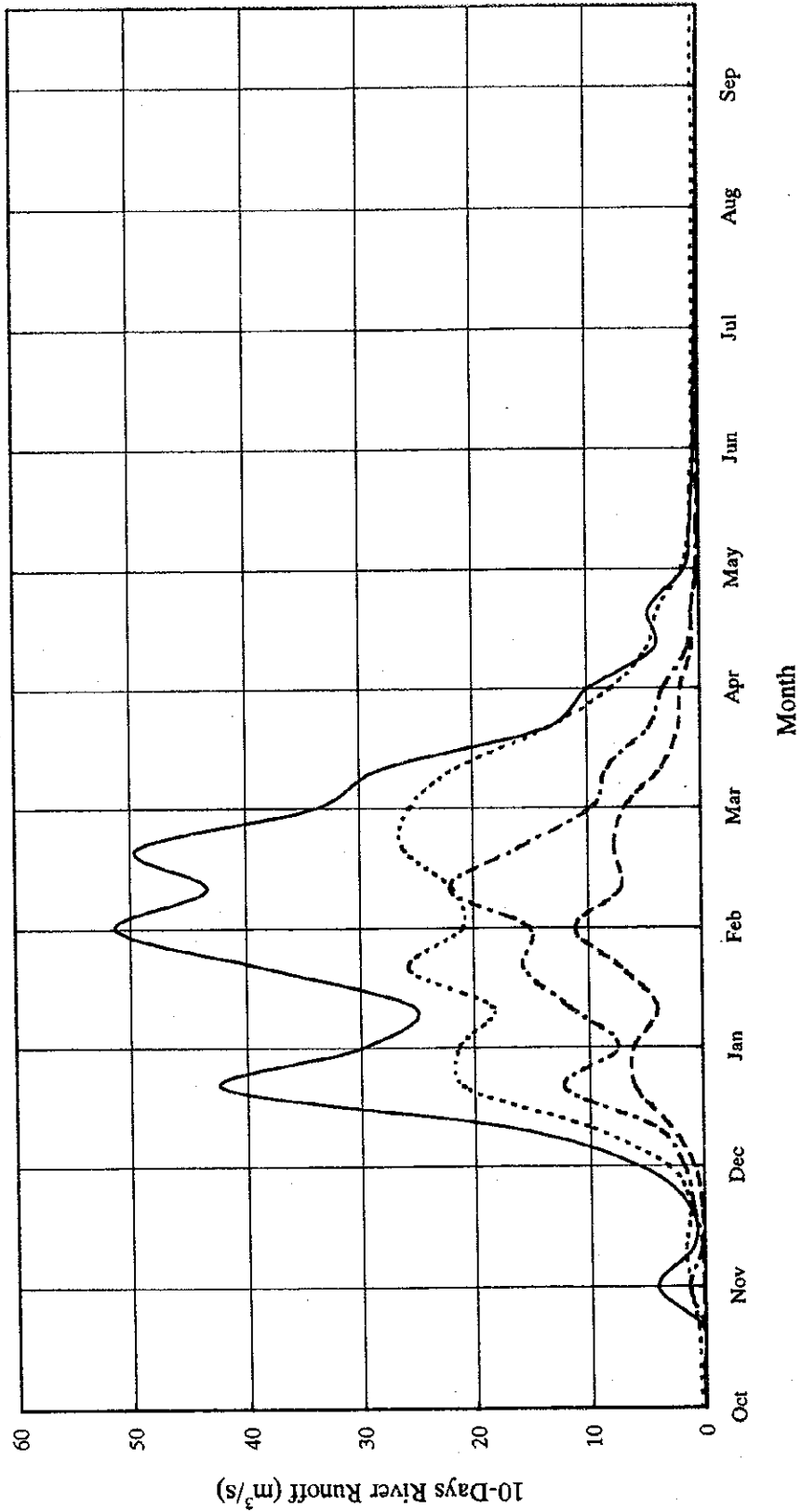


ジンバブウェ共和国
 ムニャティ川下流域農業開発計画調査
 (フィージビリティ調査)

国際協力事業団

図 3.1.1
 クドゥダム流域内の気象観測所
 及び流量観測所位置図

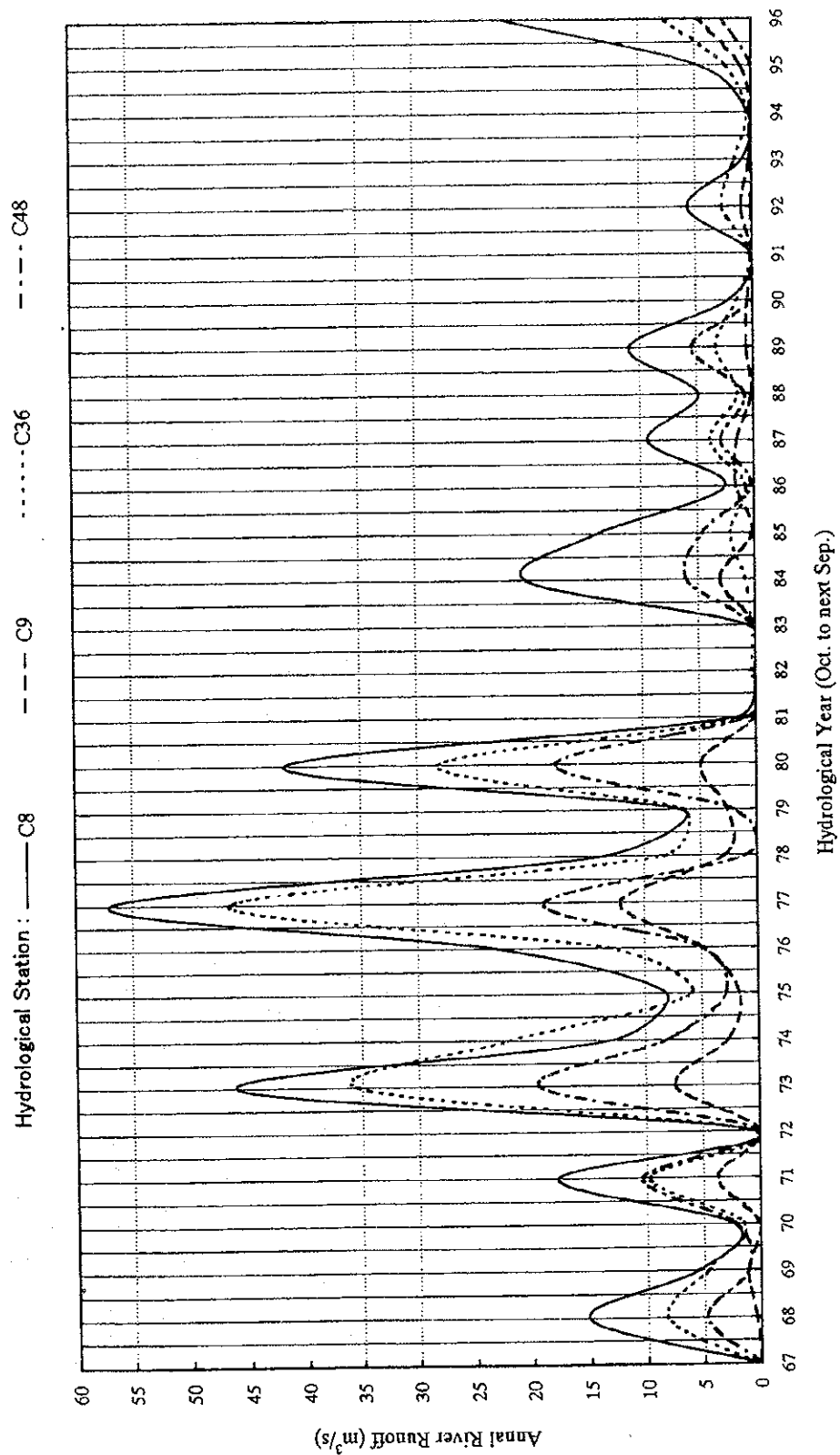
Hydrological Station : ——— C8 — — — C9 ······ C36 - - - - - C48



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

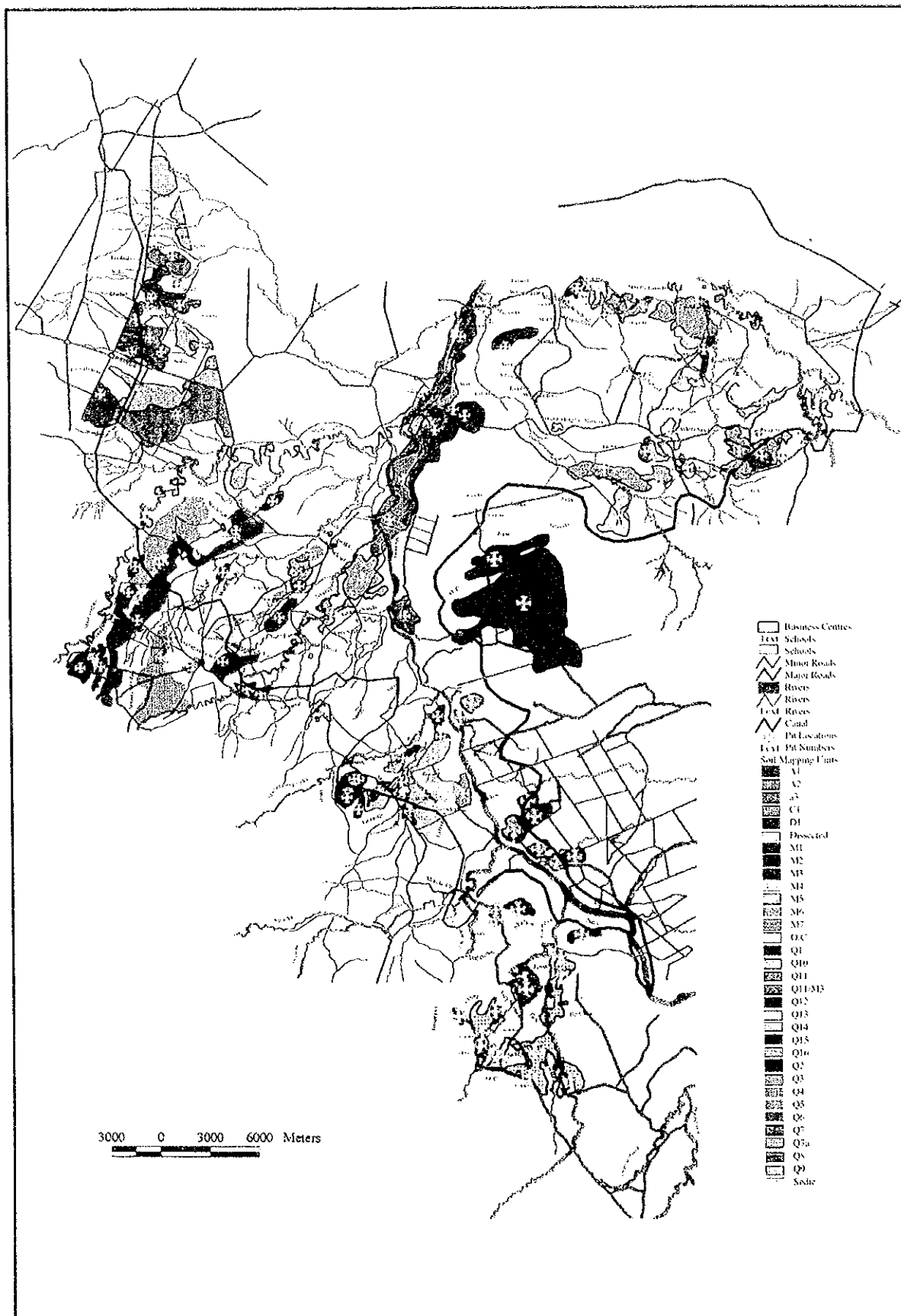
図 3.1.2
10日間平均流量



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

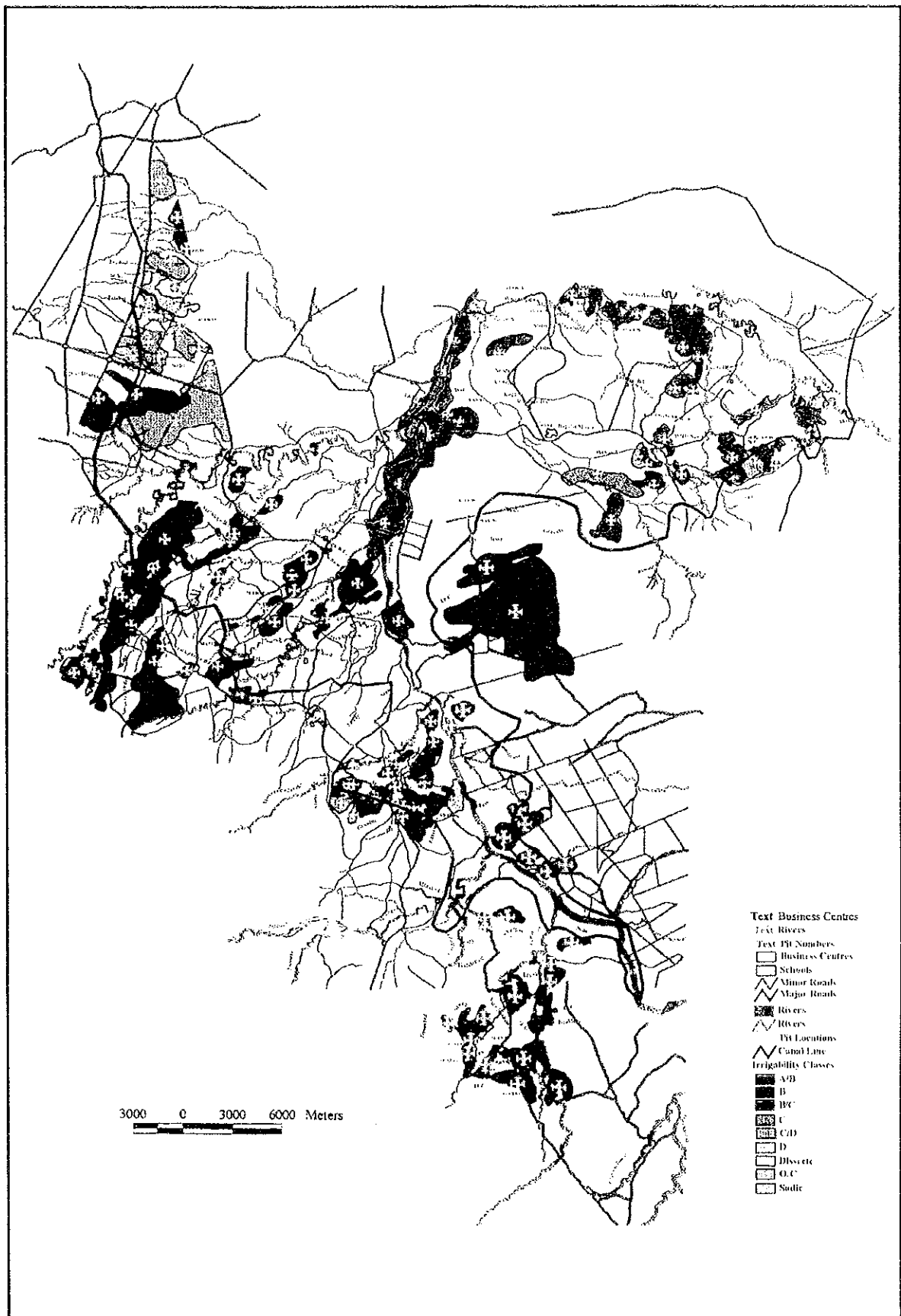
図 3.1.3
年間流量変動(30年間)



ジンバブウェ共和国
 ムニャティ川下流域農業開発計画調査
 (フィージビリティ調査)

国際協力事業団

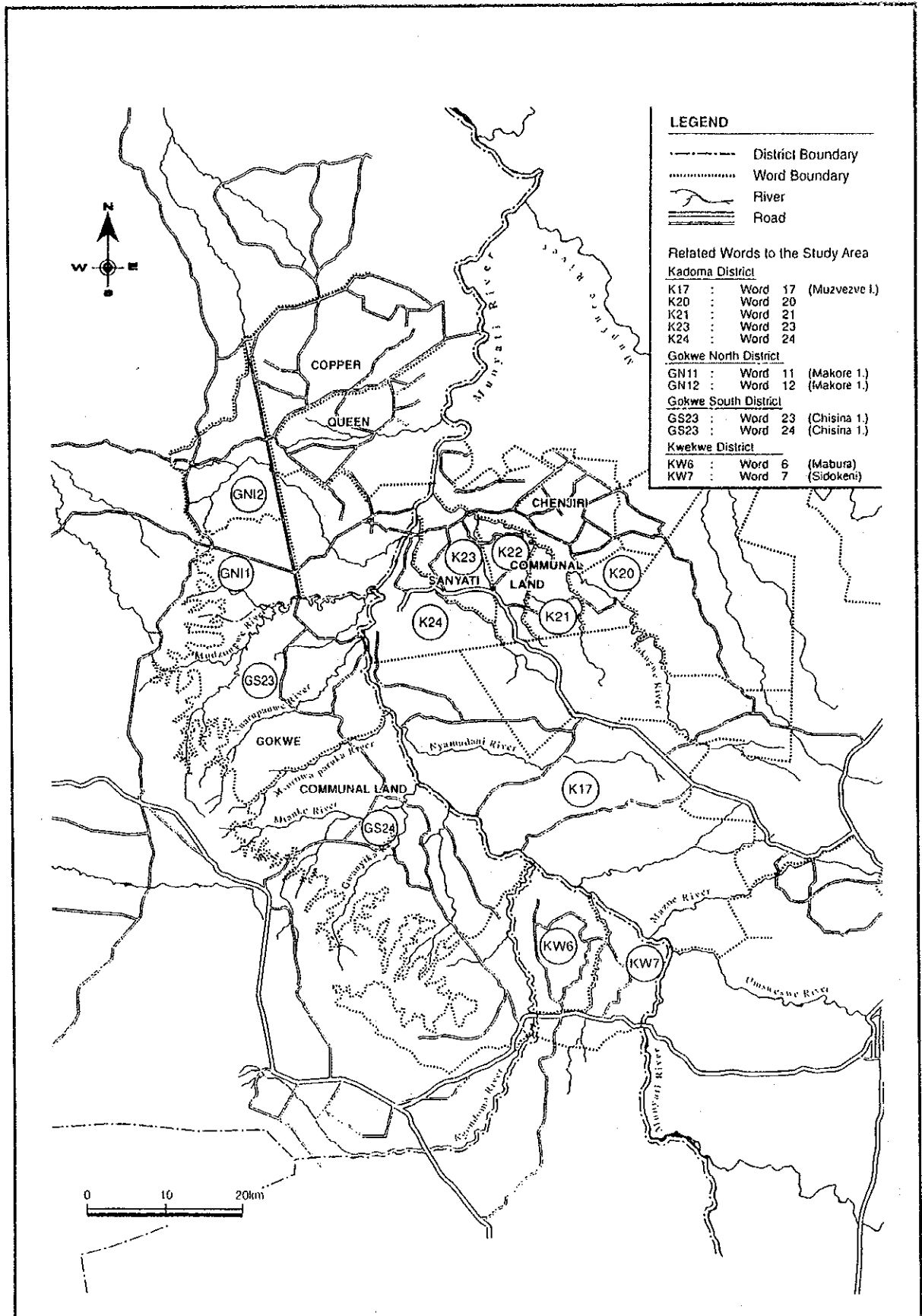
図 3.1.4
 土壌図



ジンバブウェ共和国
 ムンヤティ川下流域農業開発計画調査
 (フィージビリティ調査)

国際協力事業団

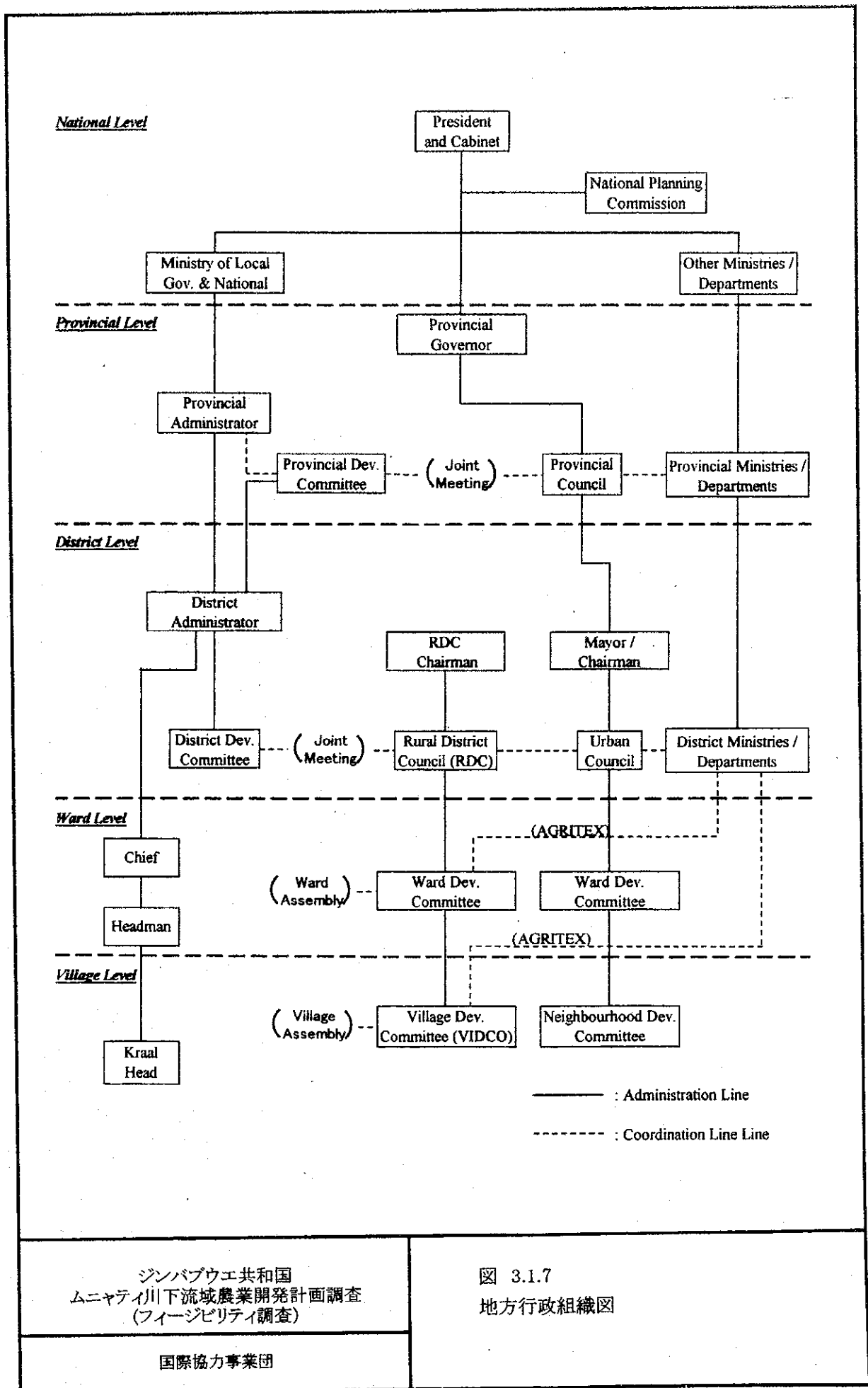
図 3.1.5
 土地分級図



ジンバブウェ共和国
ムンヤティ川下流域農業開発計画調査
(フィージビリティ調査)

図 3.1.6
調査対象地区の行政界

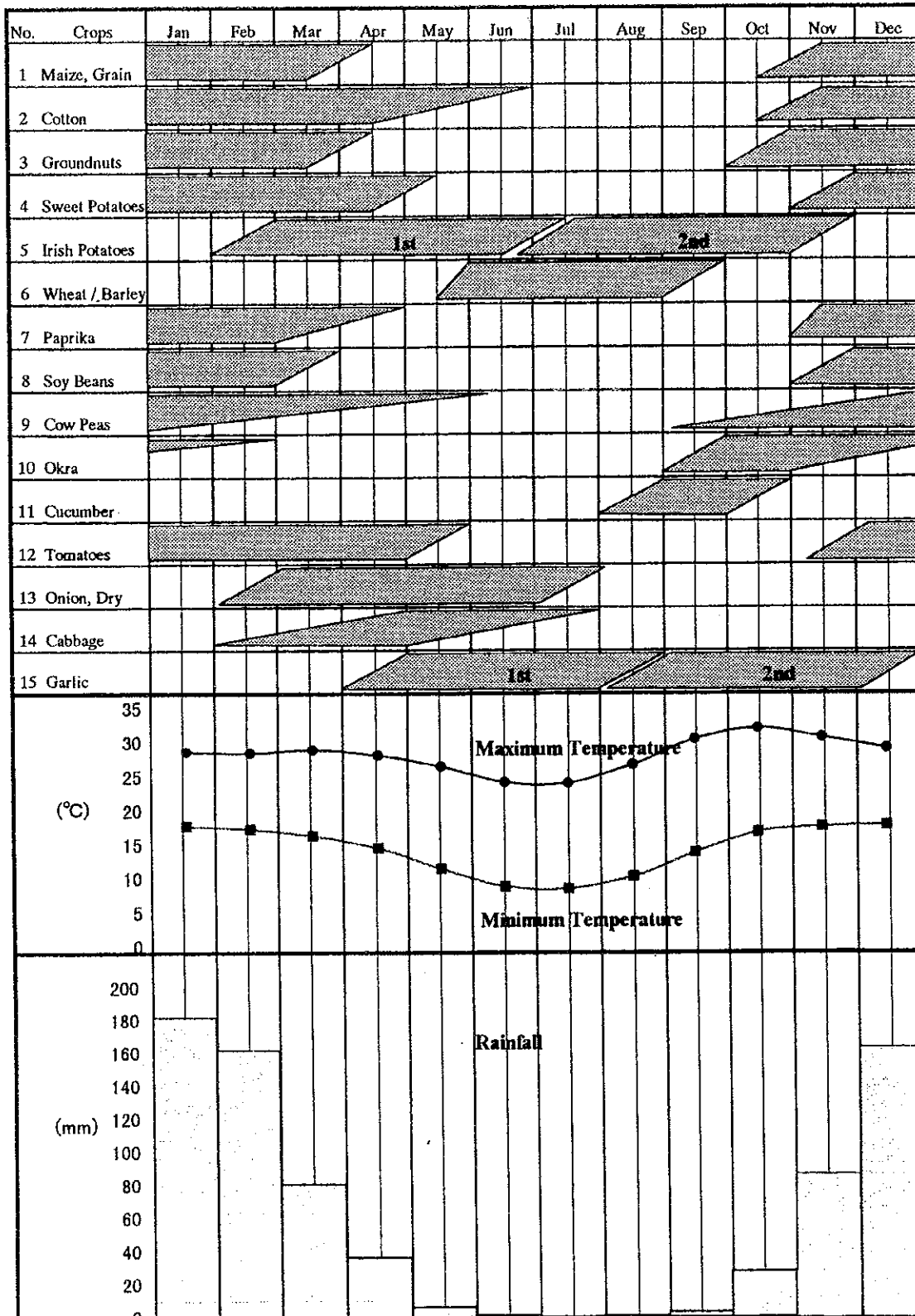
国際協力事業団



ジンバブウェ共和国
 ムニャティ川下流域農業開発計画調査
 (フィージビリティ調査)

国際協力事業団

図 3.1.7
 地方行政組織図

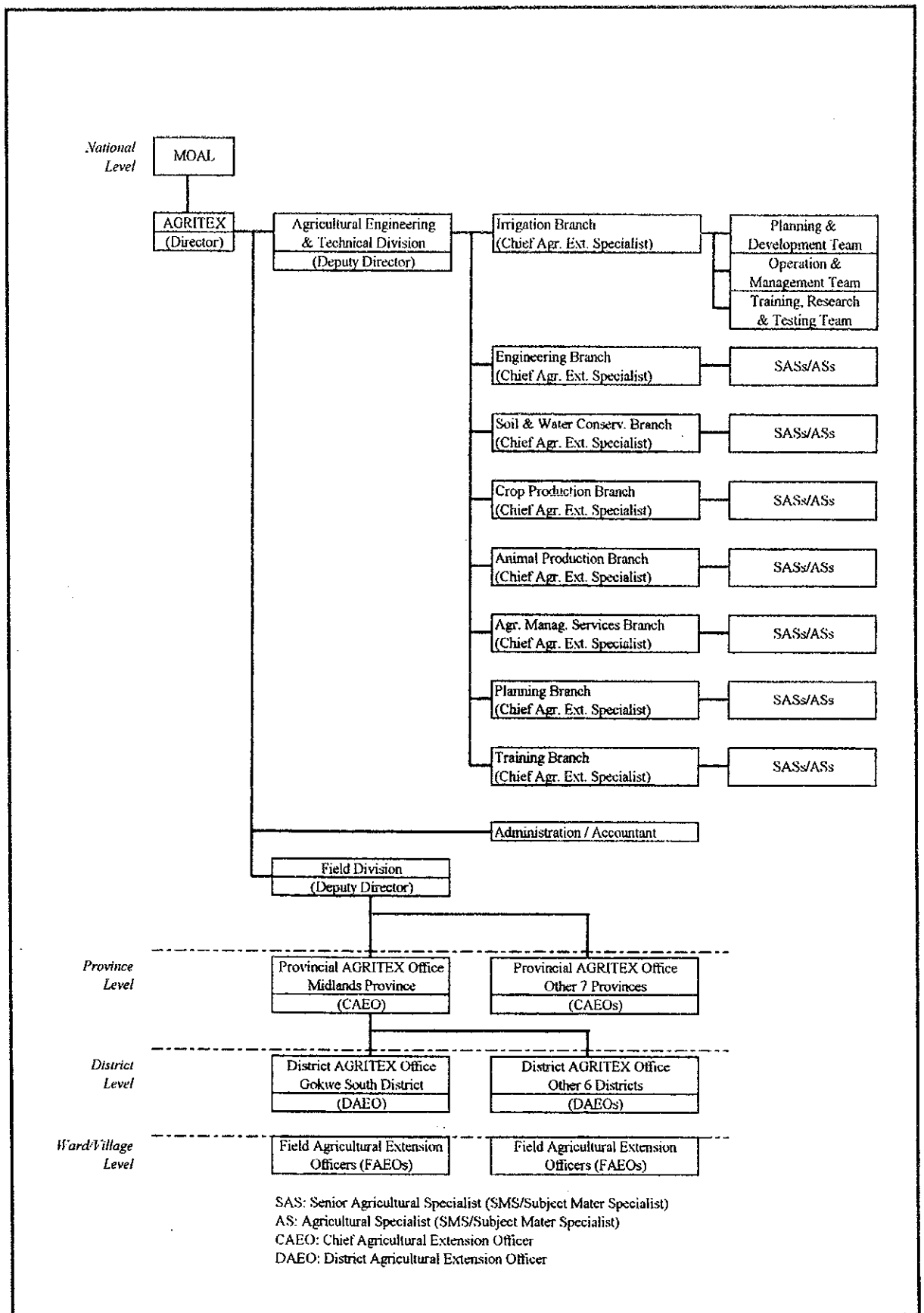


Source : Interview from extension workers, Dec. 1998

ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

図 3.1.8
計画対象地区の現況作付様式

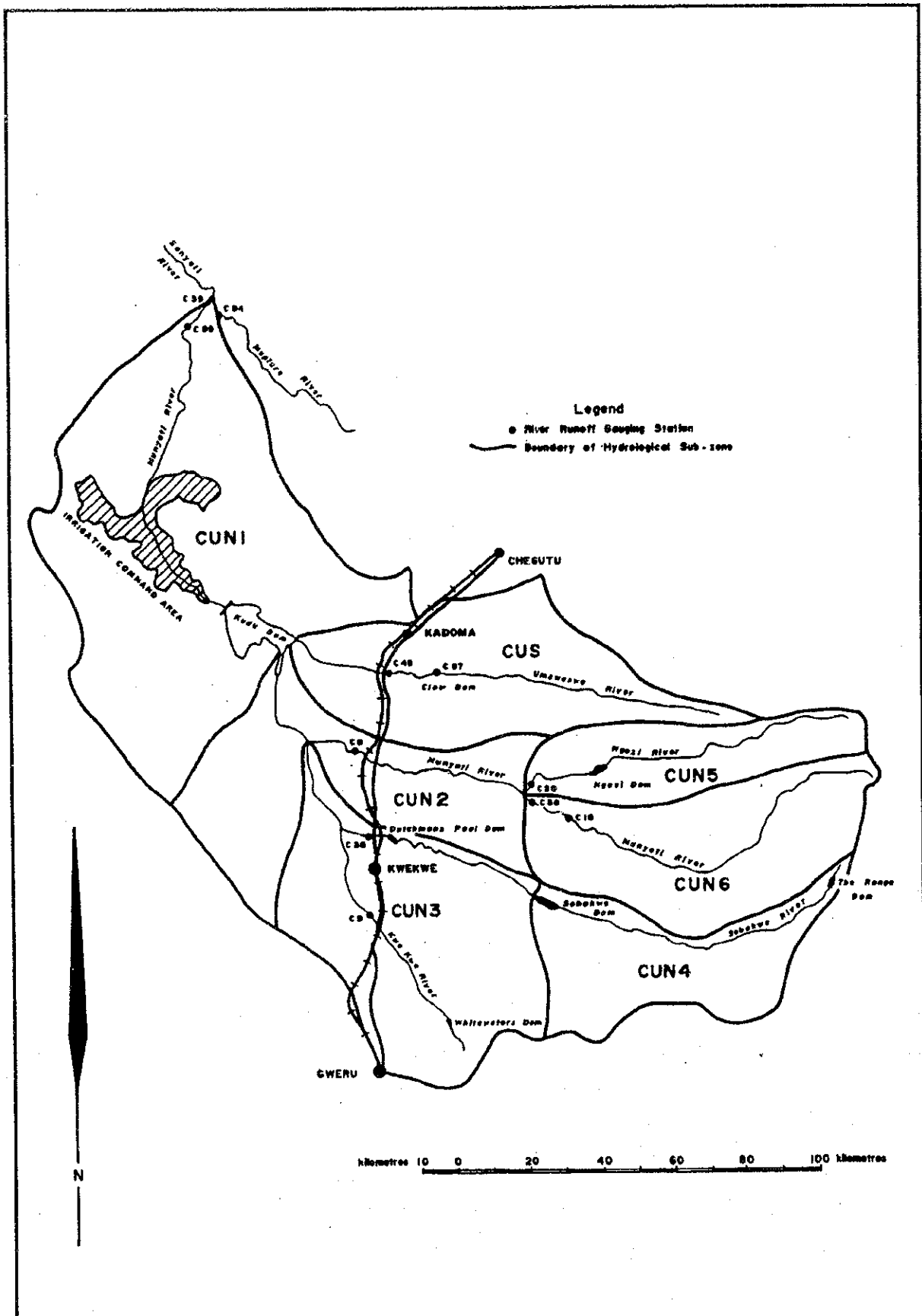


SAS: Senior Agricultural Specialist (SMS/Subject Mater Specialist)
AS: Agricultural Specialist (SMS/Subject Mater Specialist)
CAEO: Chief Agricultural Extension Officer
DAEO: District Agricultural Extension Officer

ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

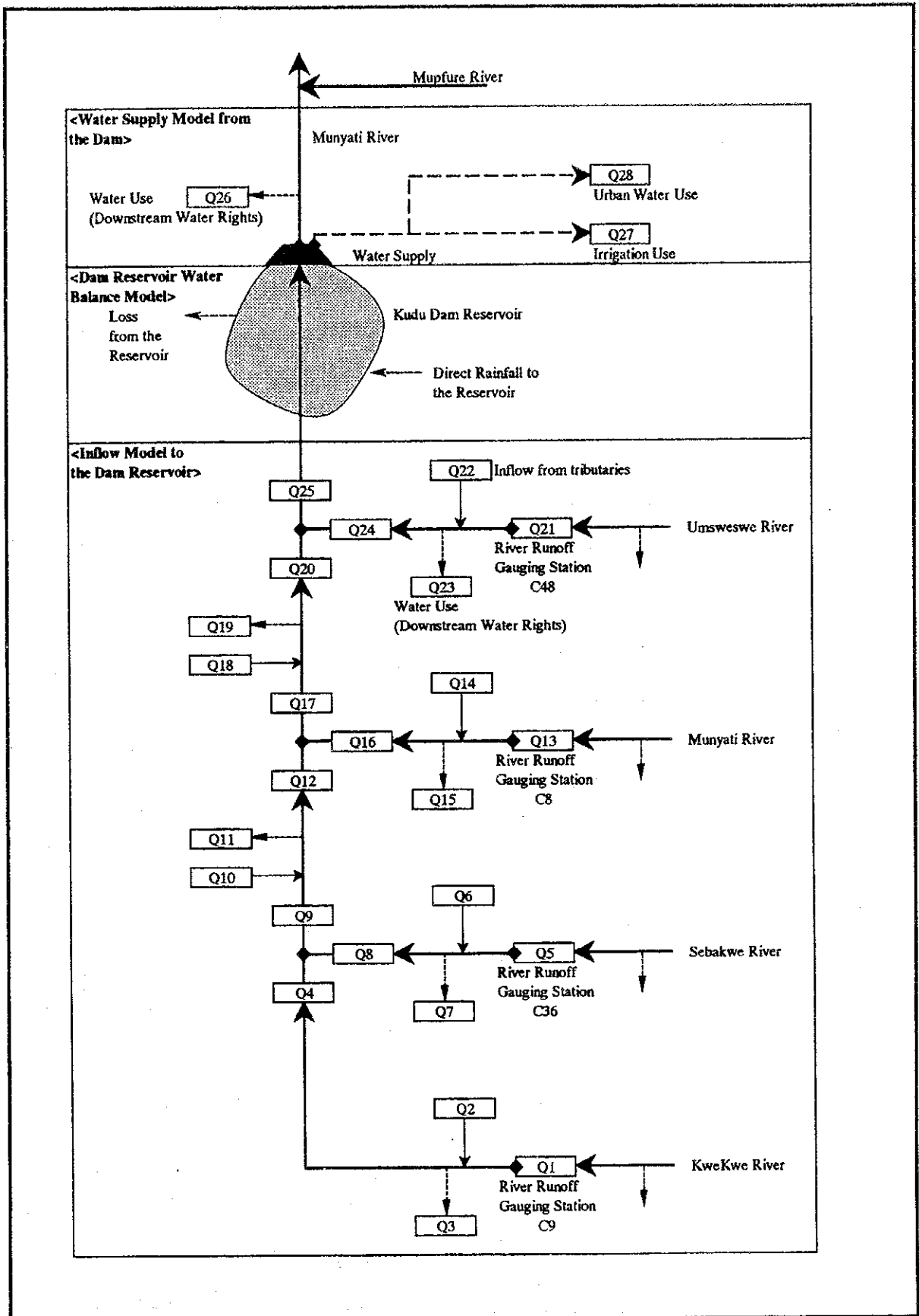
図 3.1.9
AGRITEXの組織図



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

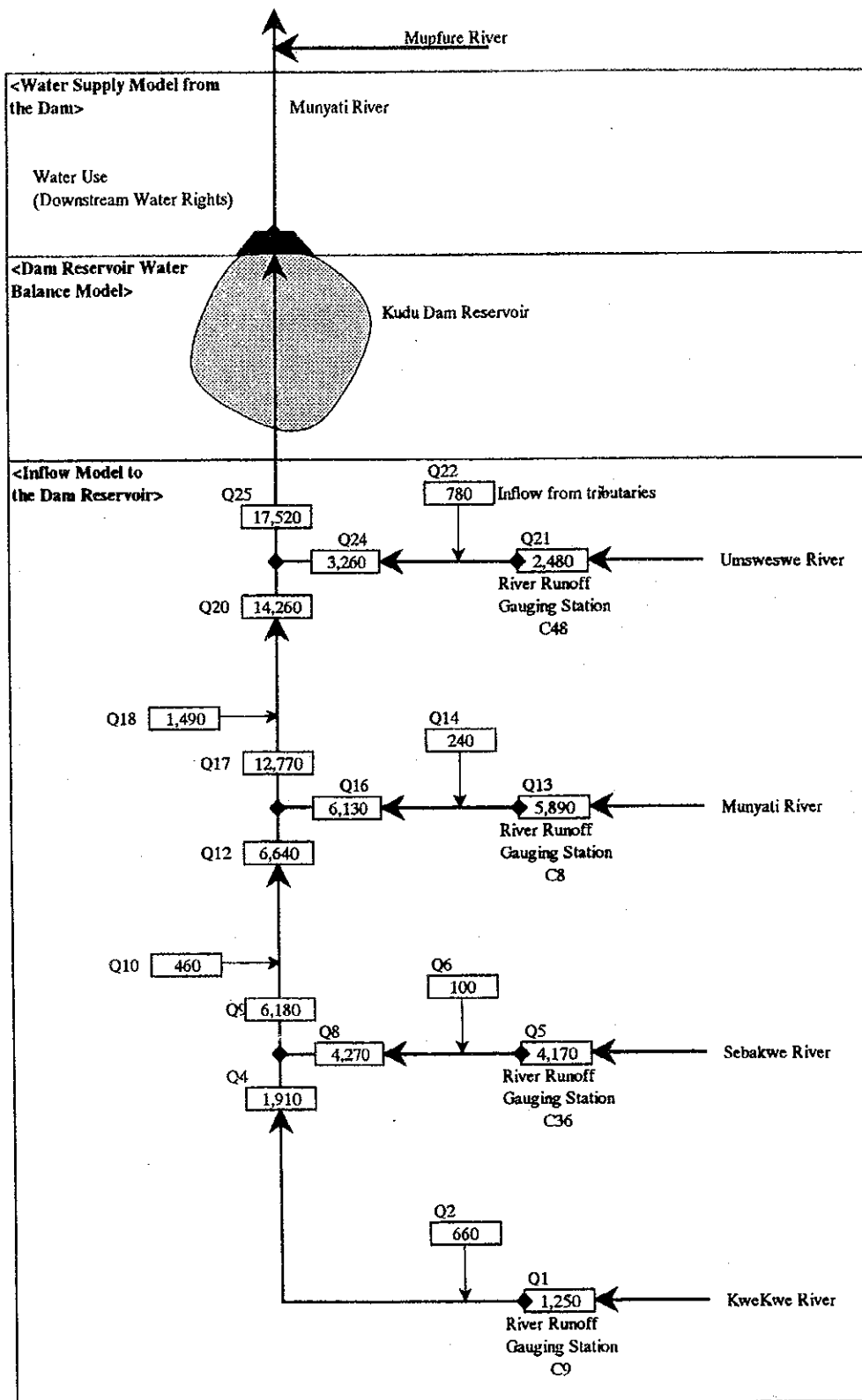
図 3.2.1
グドウダム流域内の水文流域サブゾーン



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

図 3.2.2
水収支解析モデル

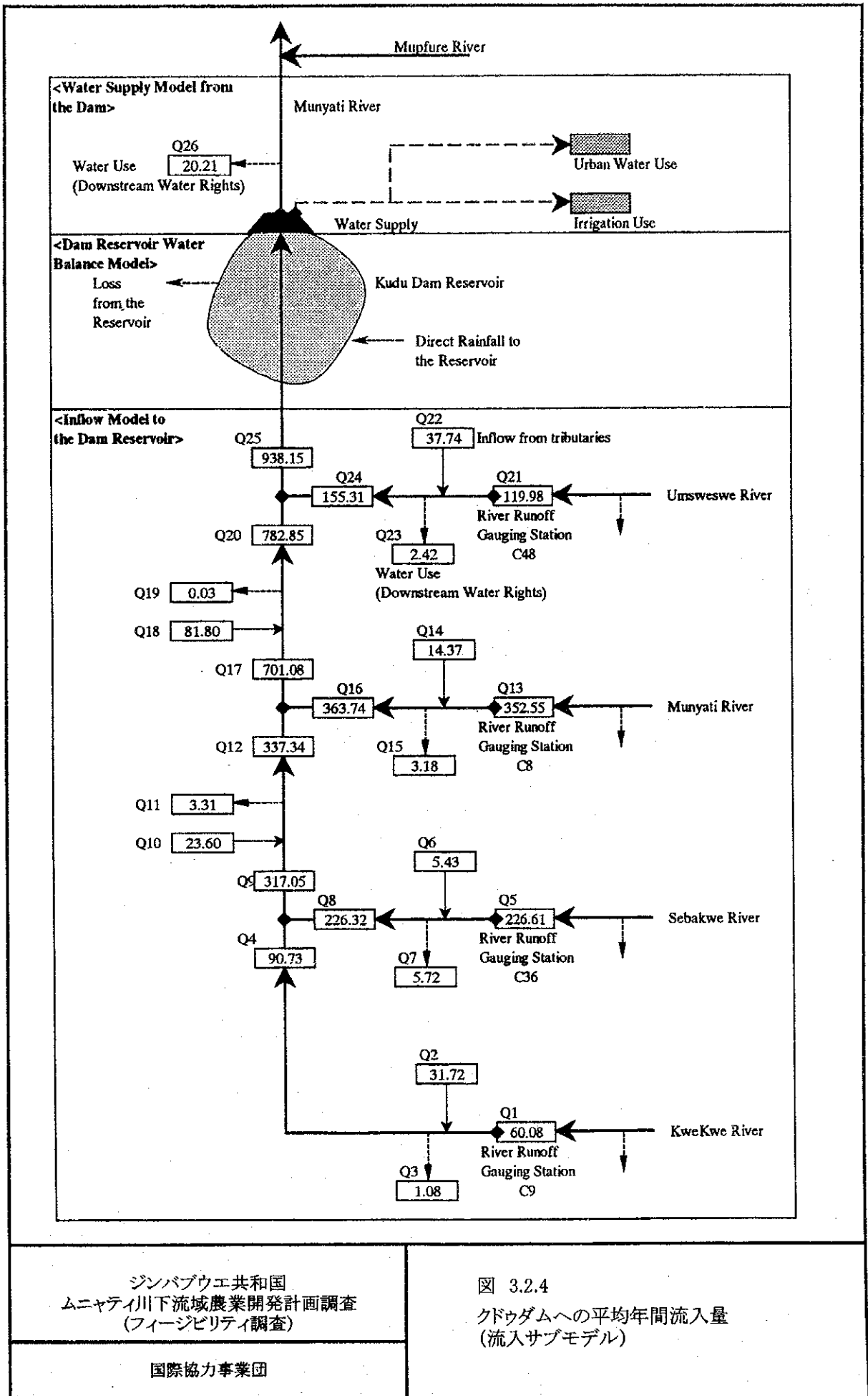
国際協力事業団



ジンバブウェ共和国
ムンヤティ川下流域農業開発計画調査
(フィージビリティ調査)

図 3.2.3
クドゥダム流域面積 (流入サブモデル)

国際協力事業団

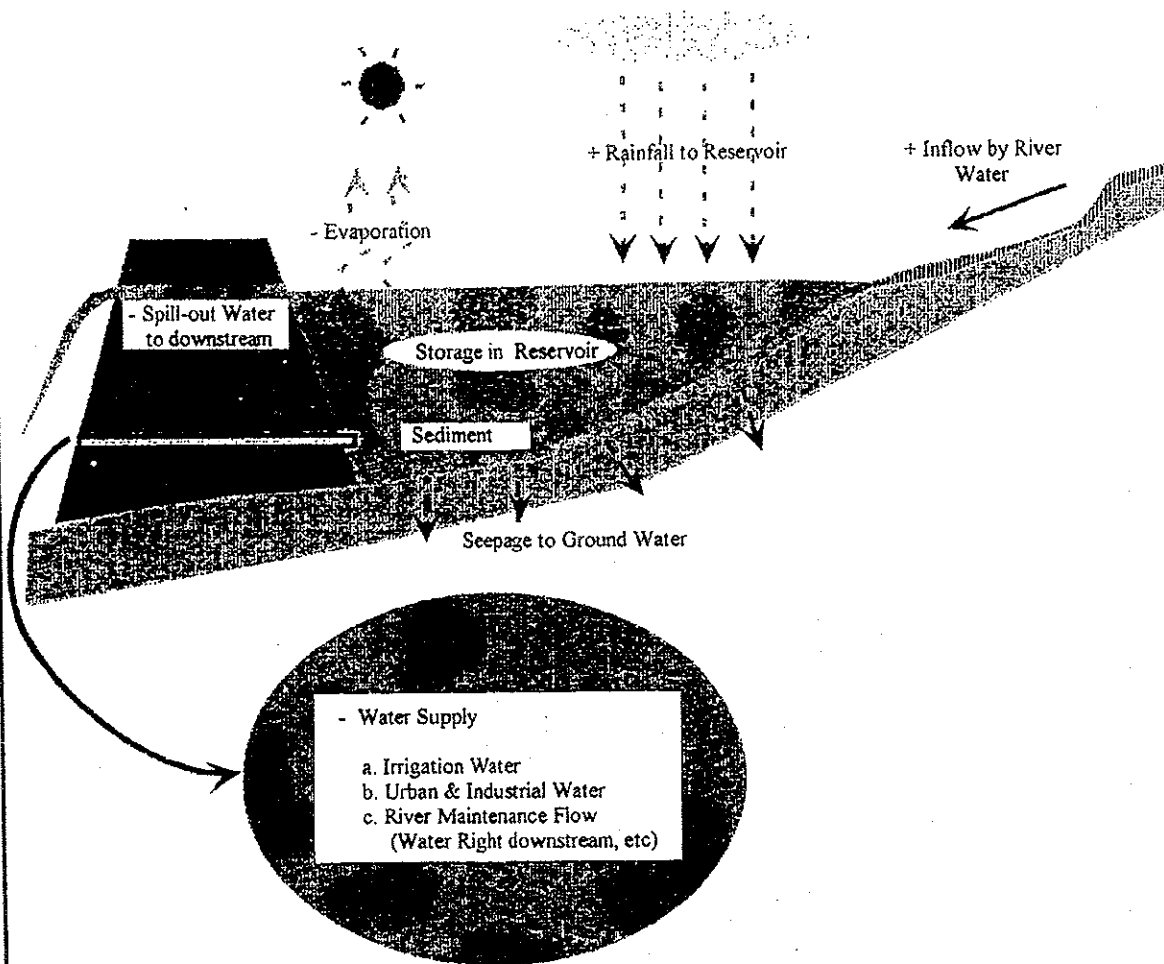


ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

図 3.2.4
クドウダムへの平均年間流入量
(流入サブモデル)

Image of Water Balance in a Reservoir



Water Balance & Reservoir Operation Study for the proposed Kudu Dam has been carried out, applying the following equation, on the basis of the above factors in the schematic reservoir.

$$\text{Storage}^*\text{present} = \text{Storage}^*\text{previous} + \text{Inflow} + \text{Rainfall}$$

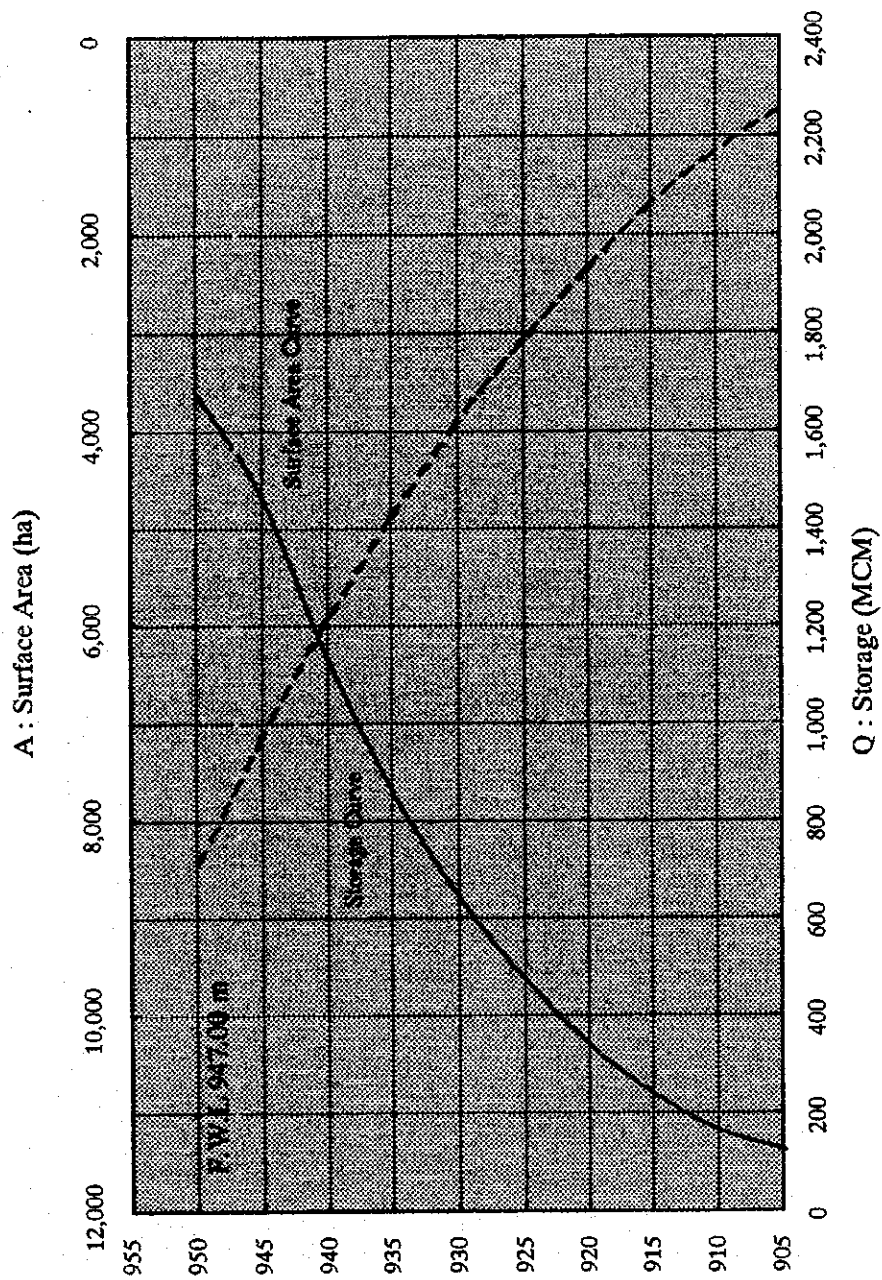
- Irrigation Water Release - Urban Water Release - River Maintenance Flow
- Evaporation Loss - Seepage Loss
- Spill-out Water when Water level is more than Full Storage Level

However, When calculated Storage*present < 0, then Storage*present = 0

ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

図 3.2.5
クドウダム水収支解析及び
ダム運営シミュレーション概念図

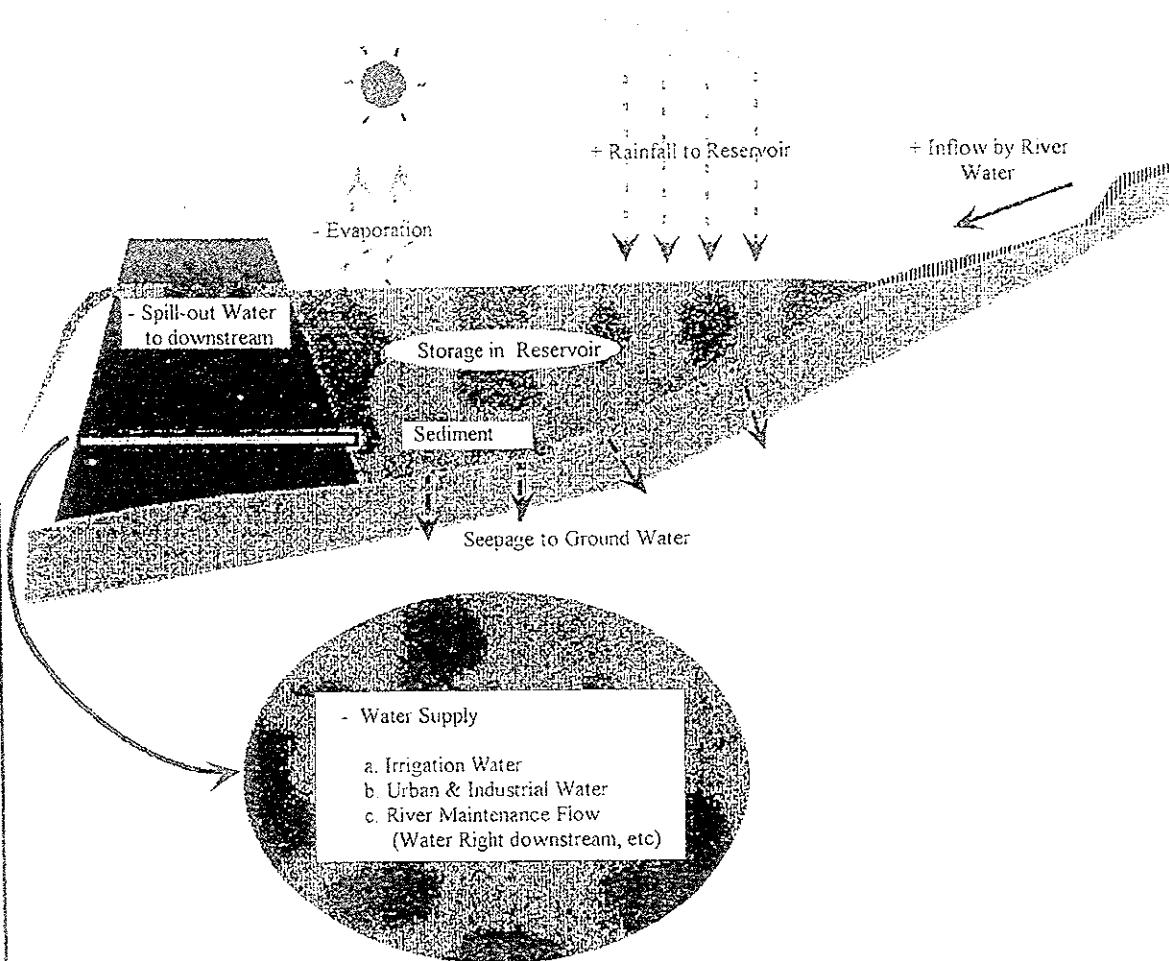


ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

図 3.2.6
クドゥダム貯水池 H-A 及び H-Q 曲線

Image of Water Balance in a Reservoir



Water Balance & Reservoir Operation Study for the proposed Kudu Dam has been carried out, applying the following equation, on the basis of the above factors in the schematic reservoir.

$$\text{Storage}^*_{\text{present}} = \text{Storage}^*_{\text{previous}} + \text{Inflow} + \text{Rainfall}$$

- Irrigation Water Release - Urban Water Release - River Maintenance Flow
- Evaporation Loss - Seepage Loss
- Spill-out Water when Water level is more than Full Storage Level

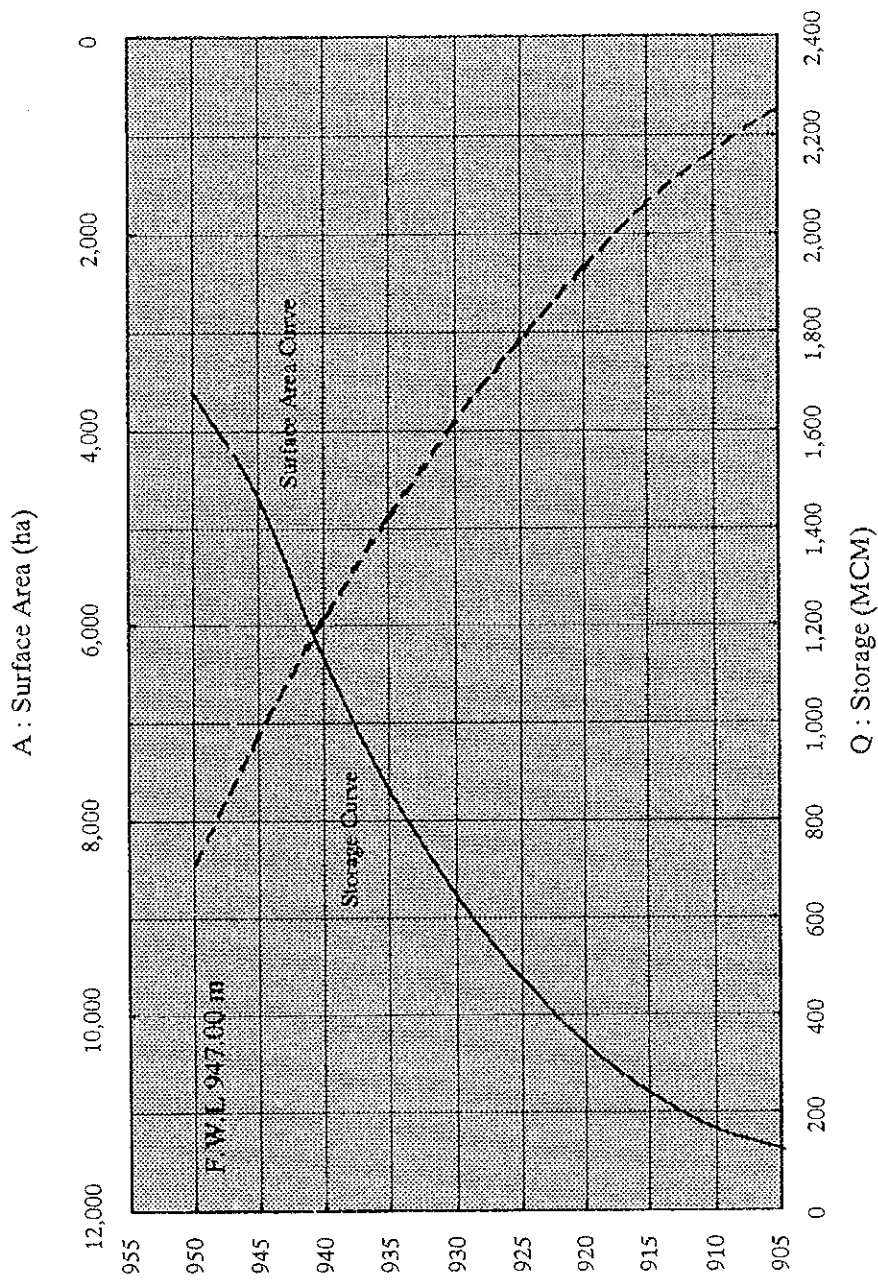
However, When calculated $\text{Storage}^*_{\text{present}} < 0$, then $\text{Storage}^*_{\text{present}} = 0$

ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フイージビリティ調査)

国際協力事業団

図 3.2.5

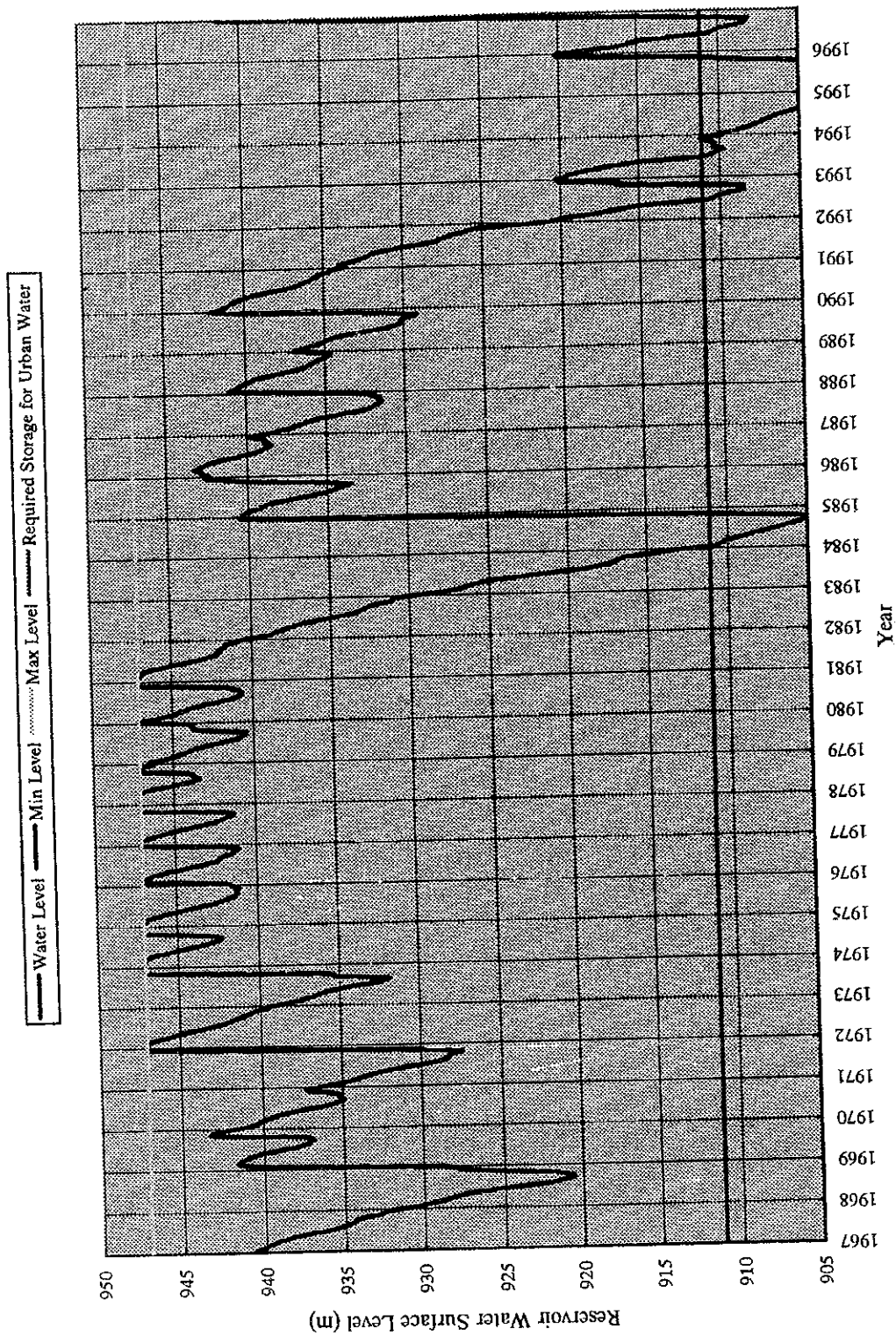
クドゥダム水収支解析及び
ダム運営シミュレーション概念図



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

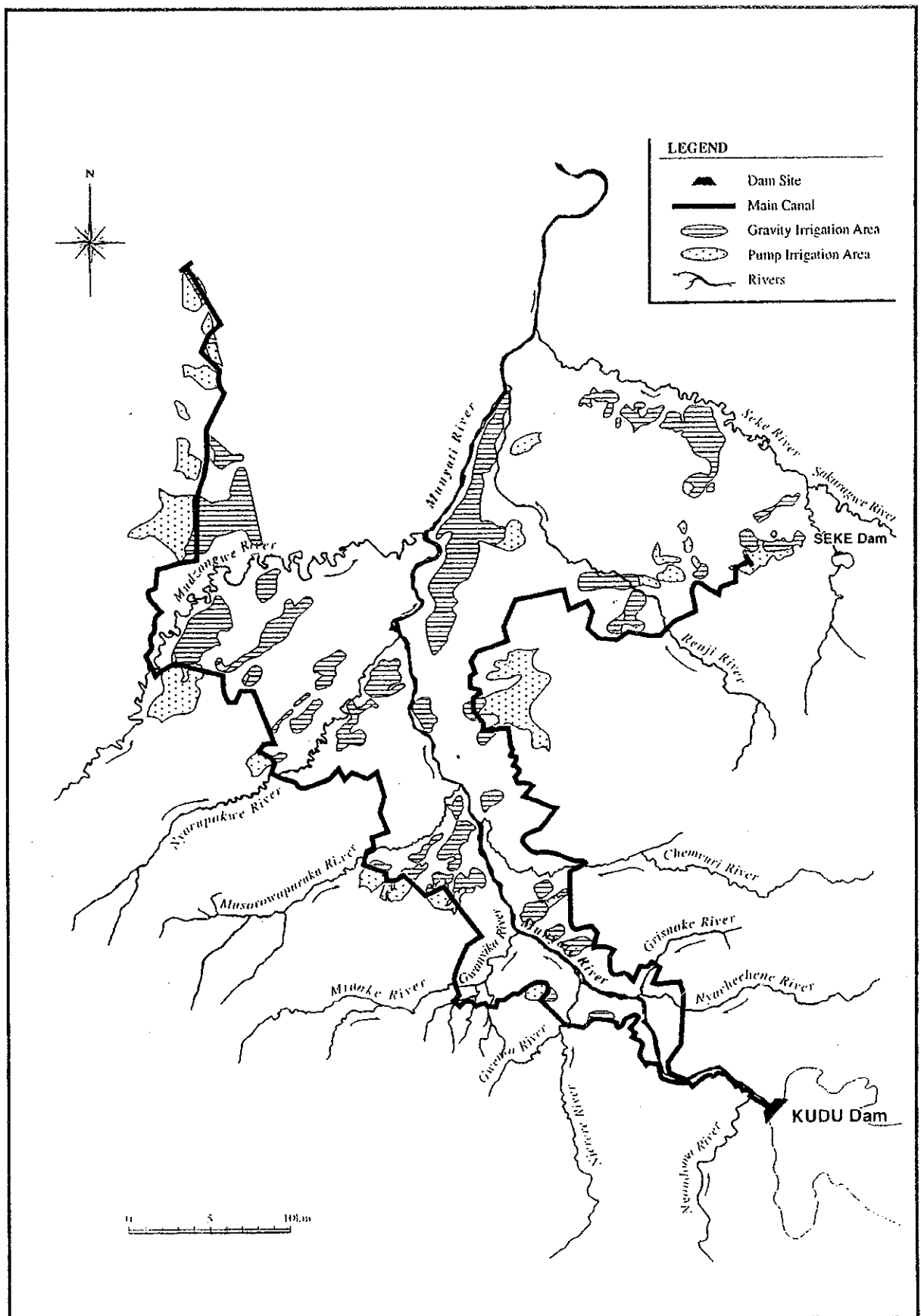
図 3.2.6
グドゥダム貯水池 H-A 及び H-Q 曲線



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

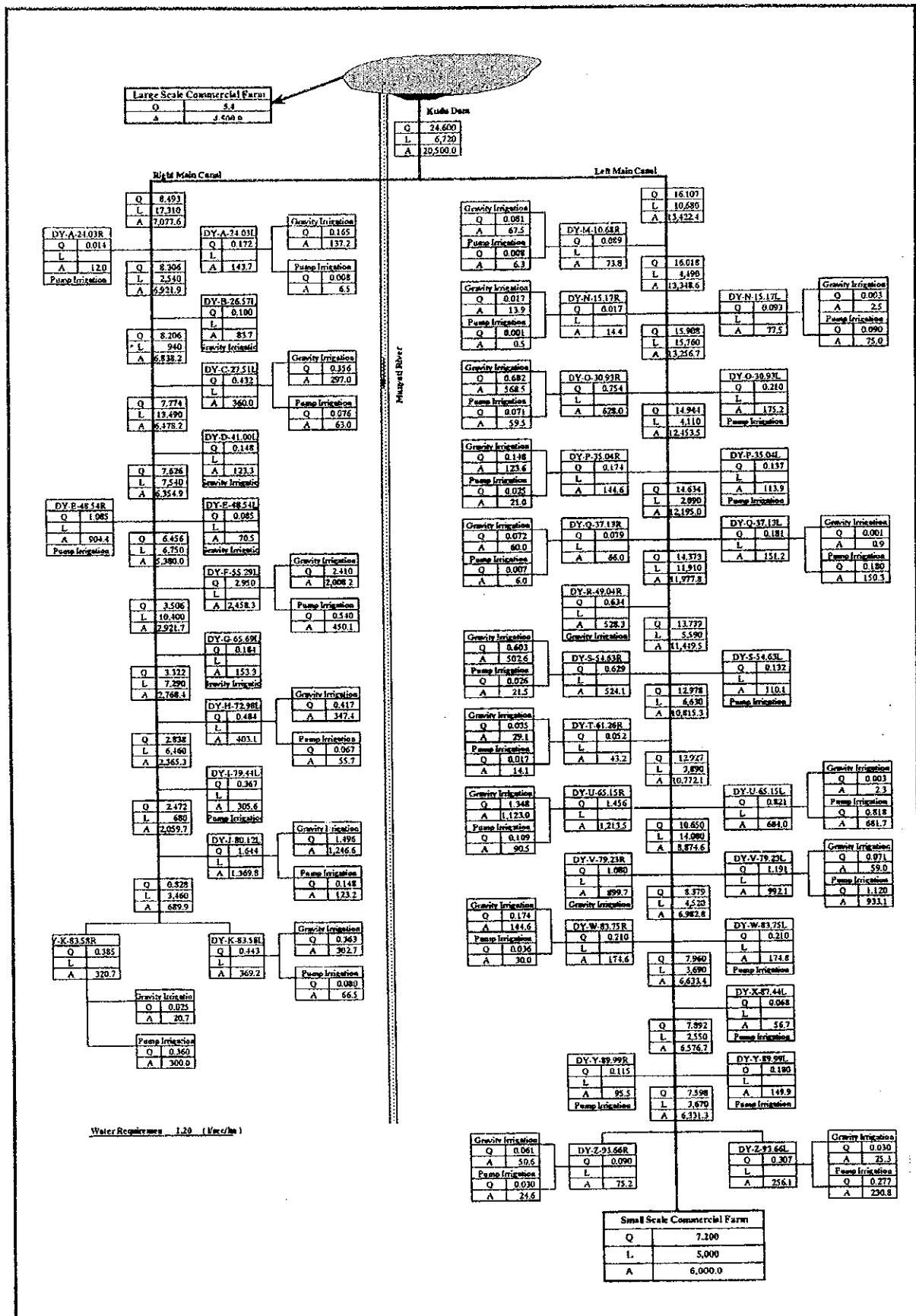
図 3.2.7
クドゥダム水収支解析結果
(灌漑面積 : 25,000ha, 満水位 : 947.00m)



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

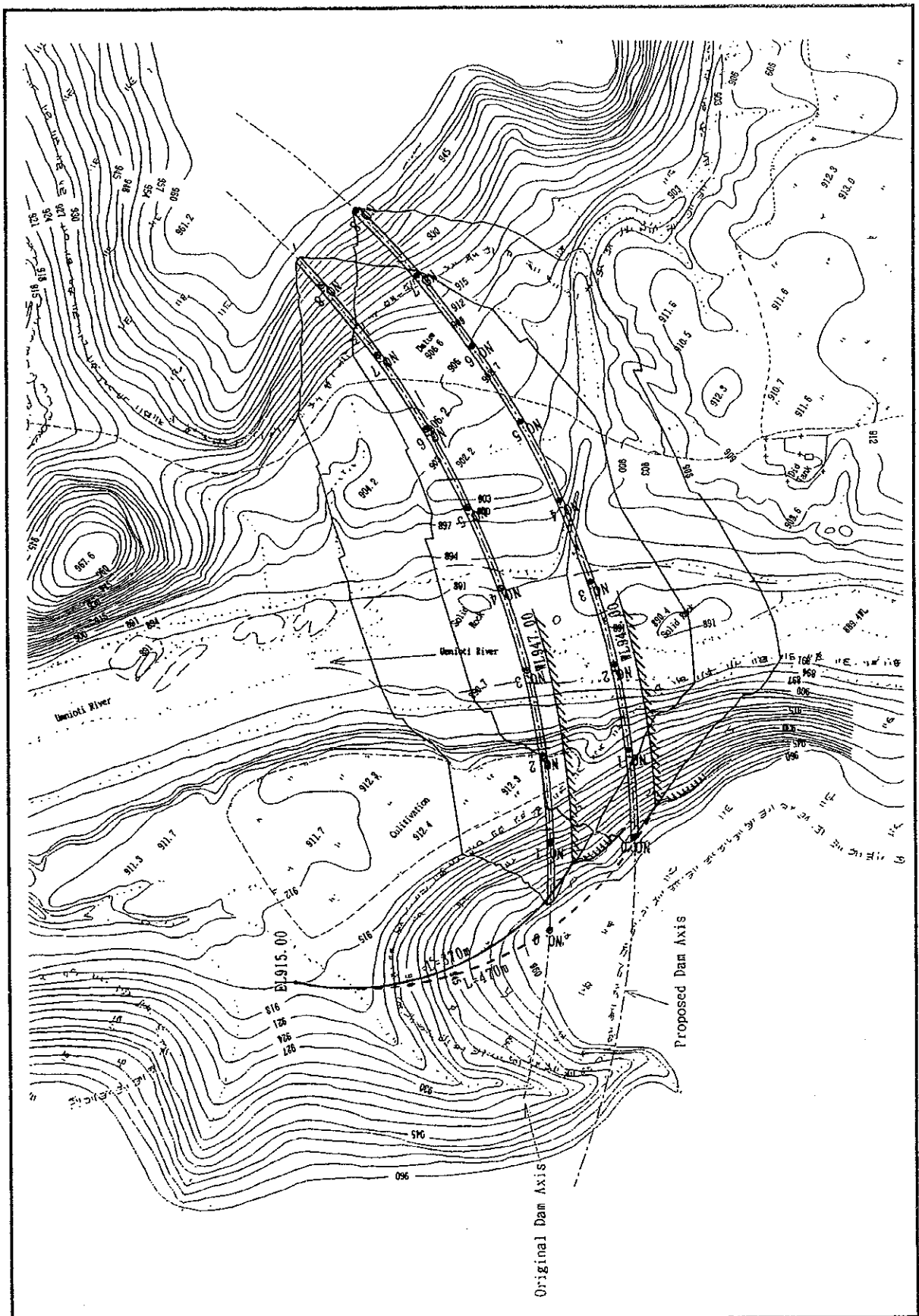
図 3.2.8
計画灌漑地区



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

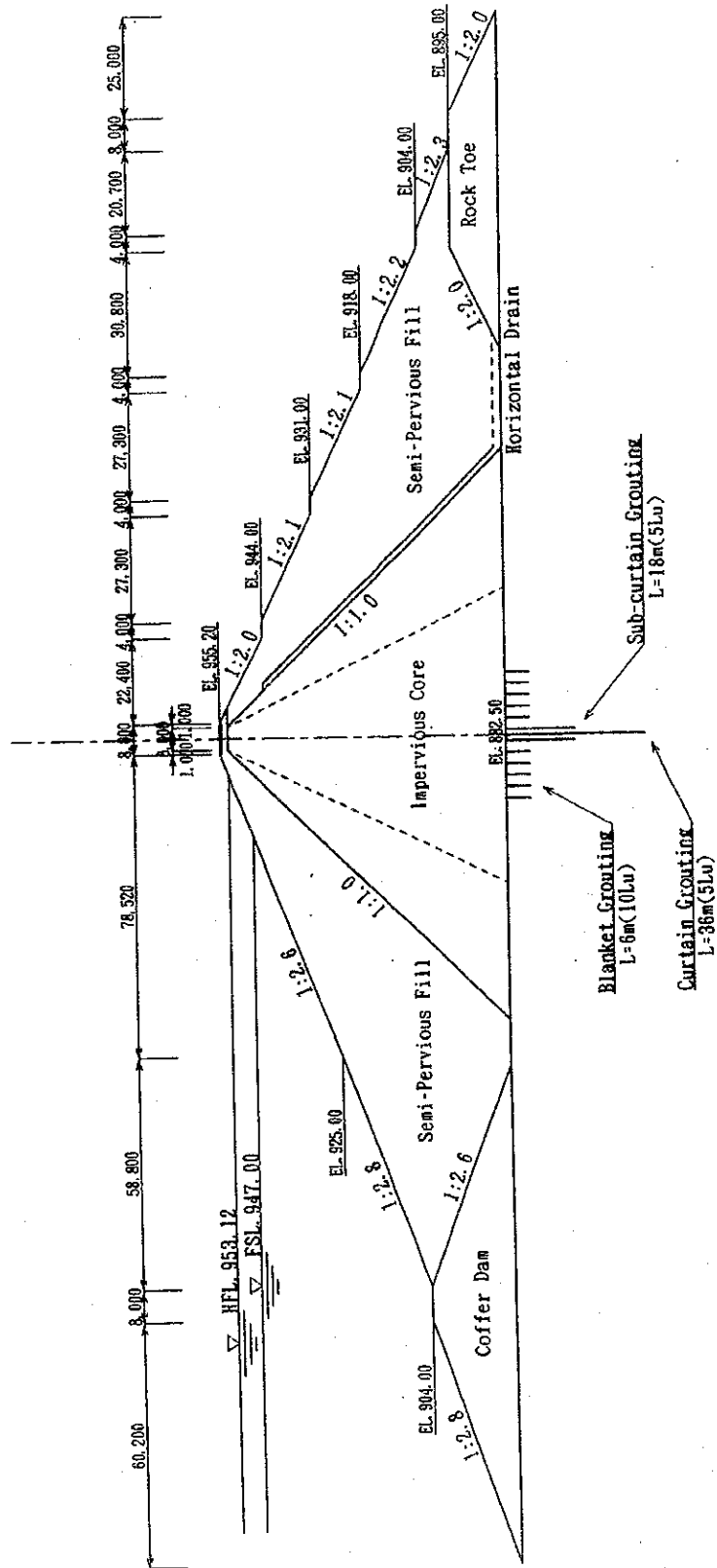
図 3.2.9
灌漑配水系統図



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

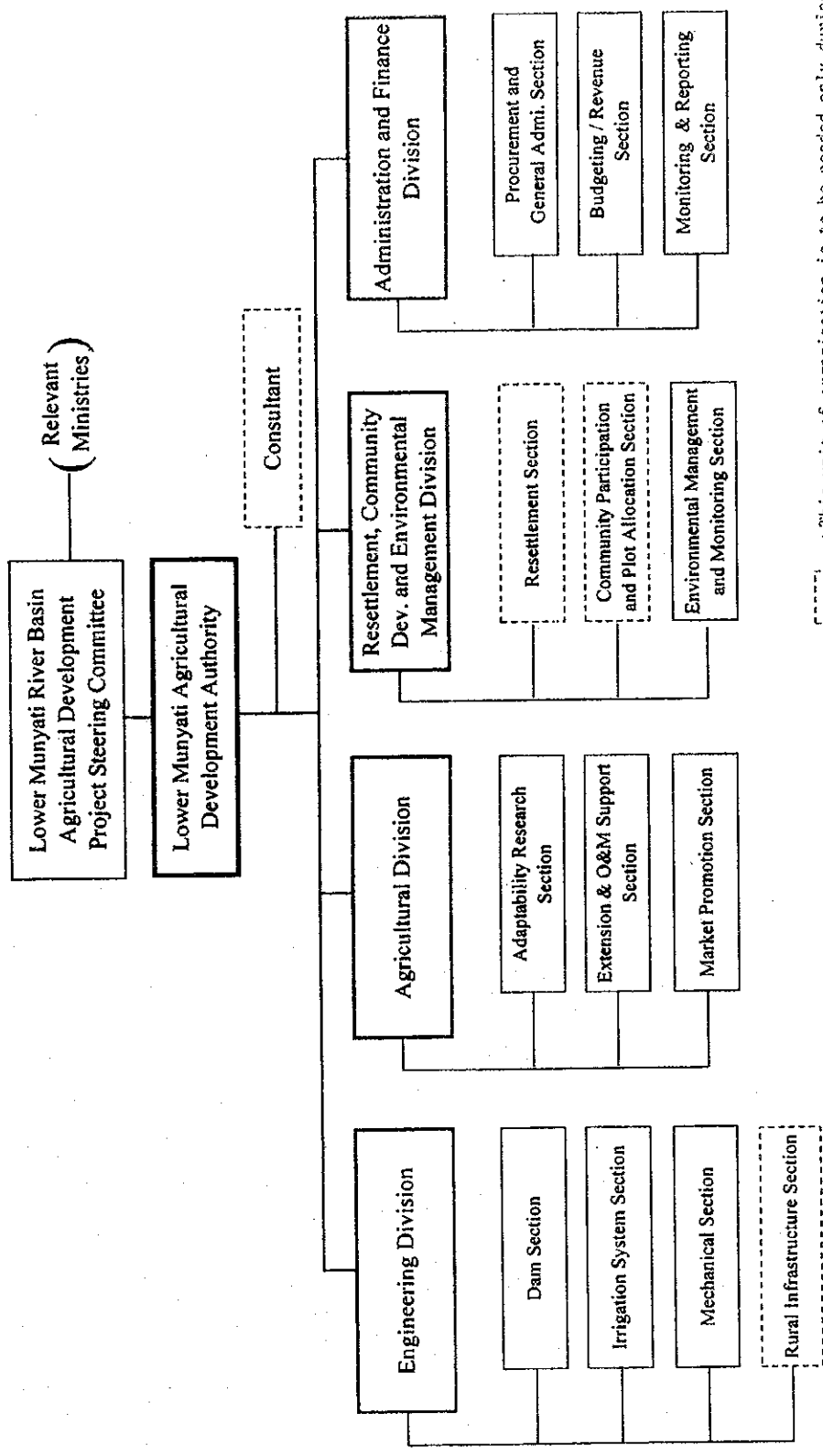
図 3.2.10
原設計ダム軸と提案ダム軸のクリープ比の比較



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

図 3.2.11
グドウダム堤体標準断面図



∴ This unit of organization is to be needed only during the construction stage.

ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フイージビリティ調査)

国際協力事業団

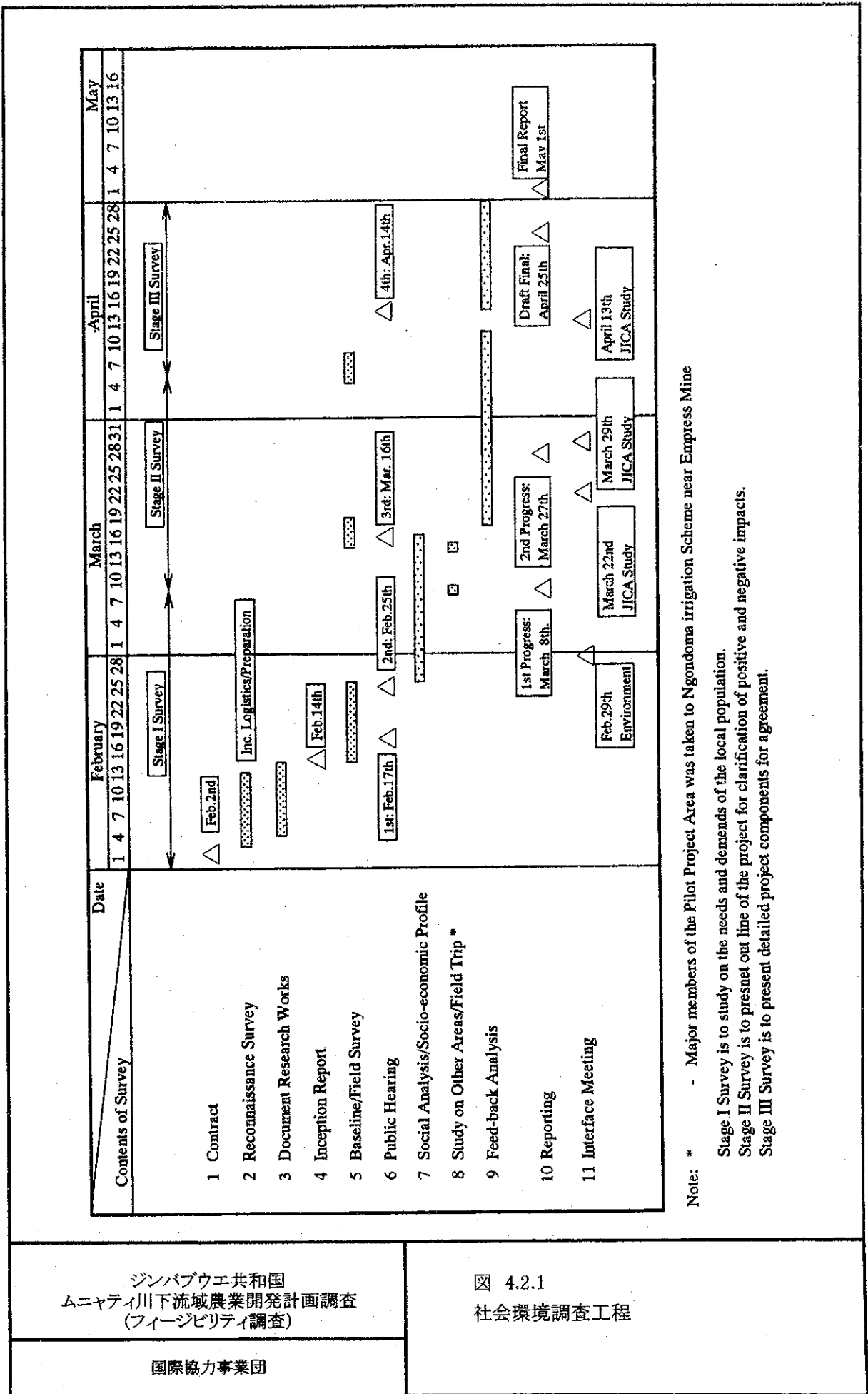
図 3.2.12
ムニャティ川下流域農業開発公団 組織図

Work Items	Work Qty	Year														
		2000 1st	2001 2nd	2002 3rd	2003 4th	2004 5th	2005 6th	2006 7th	2007 8th	2008 9th	2009 10th	2010 11th	2011 12th	2012 13th	2013 14th	
1. Feasibility Study	-	██████████														
2. Detailed Design & Pre-construction Work	-	██████████														
3. Environmental Management Components																
(a) Resettlement Action	L.S.			██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
(b) Land Re-allocation	L.S.			██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
4. Pilot Project																
(a) Nyarupwe Dam and Small Dam	2 nos.			██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
(b) Irrigation & Drainage	60 ha			██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
(c) Livestock	L.S.			██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
(d) Rural Infrastructure	L.S.			██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
(e) Institutional Strengthening	L.S.			██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
(f) Agricultural Support Services	L.S.			██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████	██████████
5. Kudu Dam Irrigation System																
(a) Kudu Dam	1 no.															
(b) Main & Secondary Irrigation Canal System	178 km															
(c) On-Farm Development																
- Communal and Resettlement Areas	14,500 ha															
- Small Scale Commercial farm	6,000 ha															
- Large Scale Commercial Farm	4,500 ha															
6. Livestock																
(a) Livestock Water Development Scheme	72 units															
(b) Grazing Area Development Scheme	10 units															
7. Rural Infrastructures																
(a) Rural Road Improvement	279 km															
(b) Construction/Rehabilitation of Boreholes	191 nos.															
(c) Improvement of Communication System	L.S.															
8. Agricultural Support Services																
(a) Agricultural Extension Center	2 units															
(b) Extension Services	L.S.															

ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

図 3.3.1
事業実施スケジュール

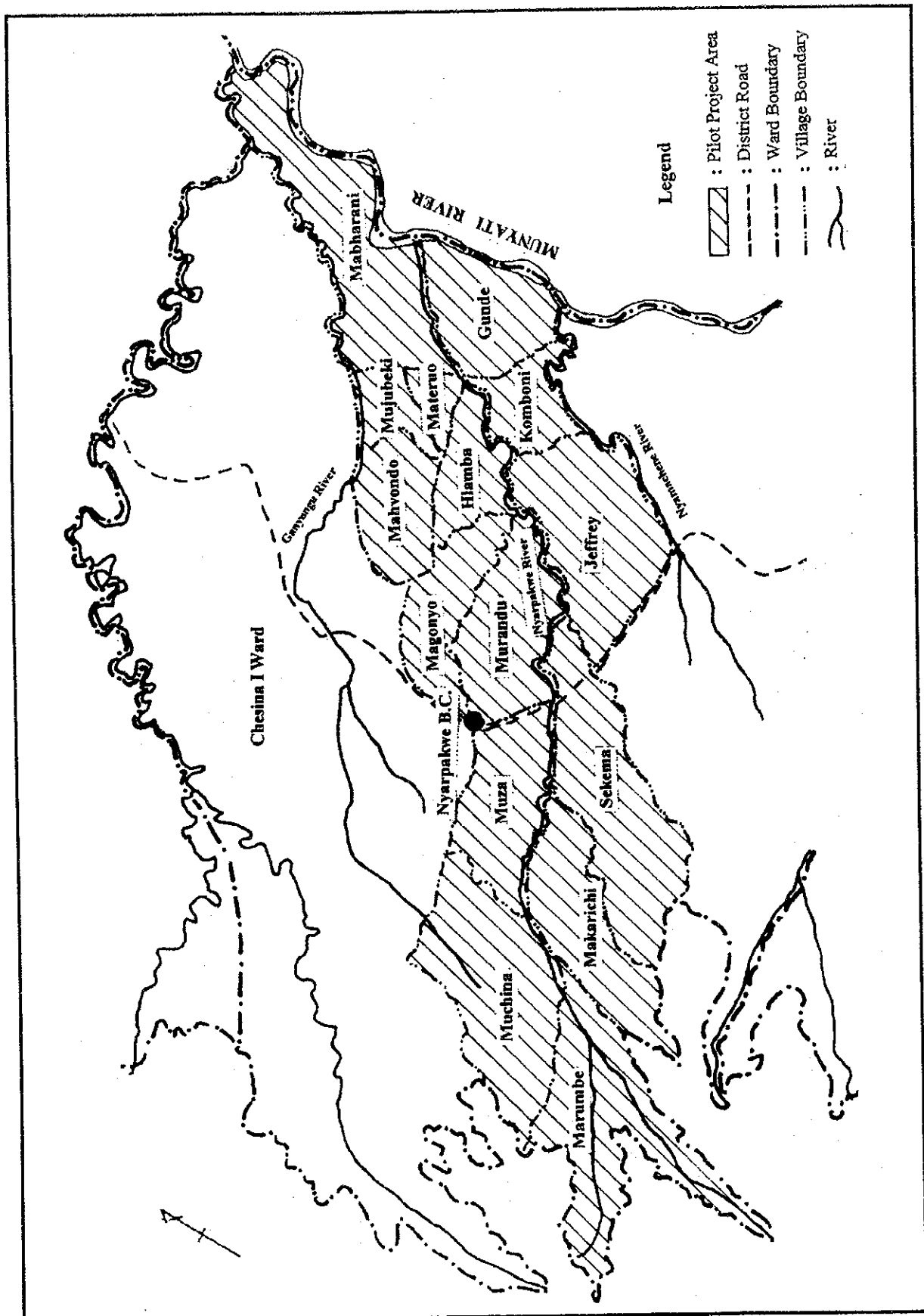
国際協力事業団



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

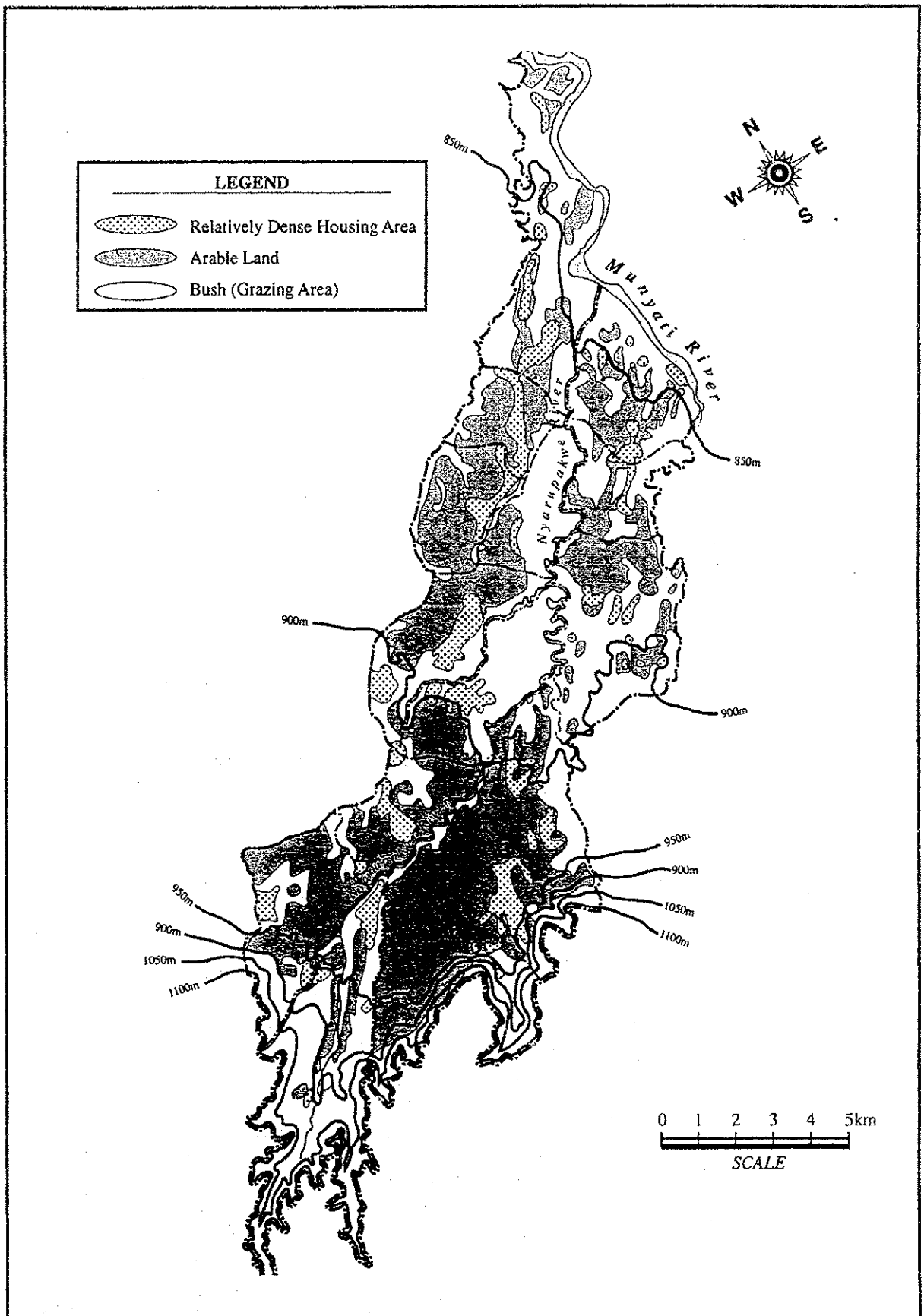
図 4.2.1
社会環境調査工程



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

図 4.3.1
ニャルパクウェ・パイロット地区

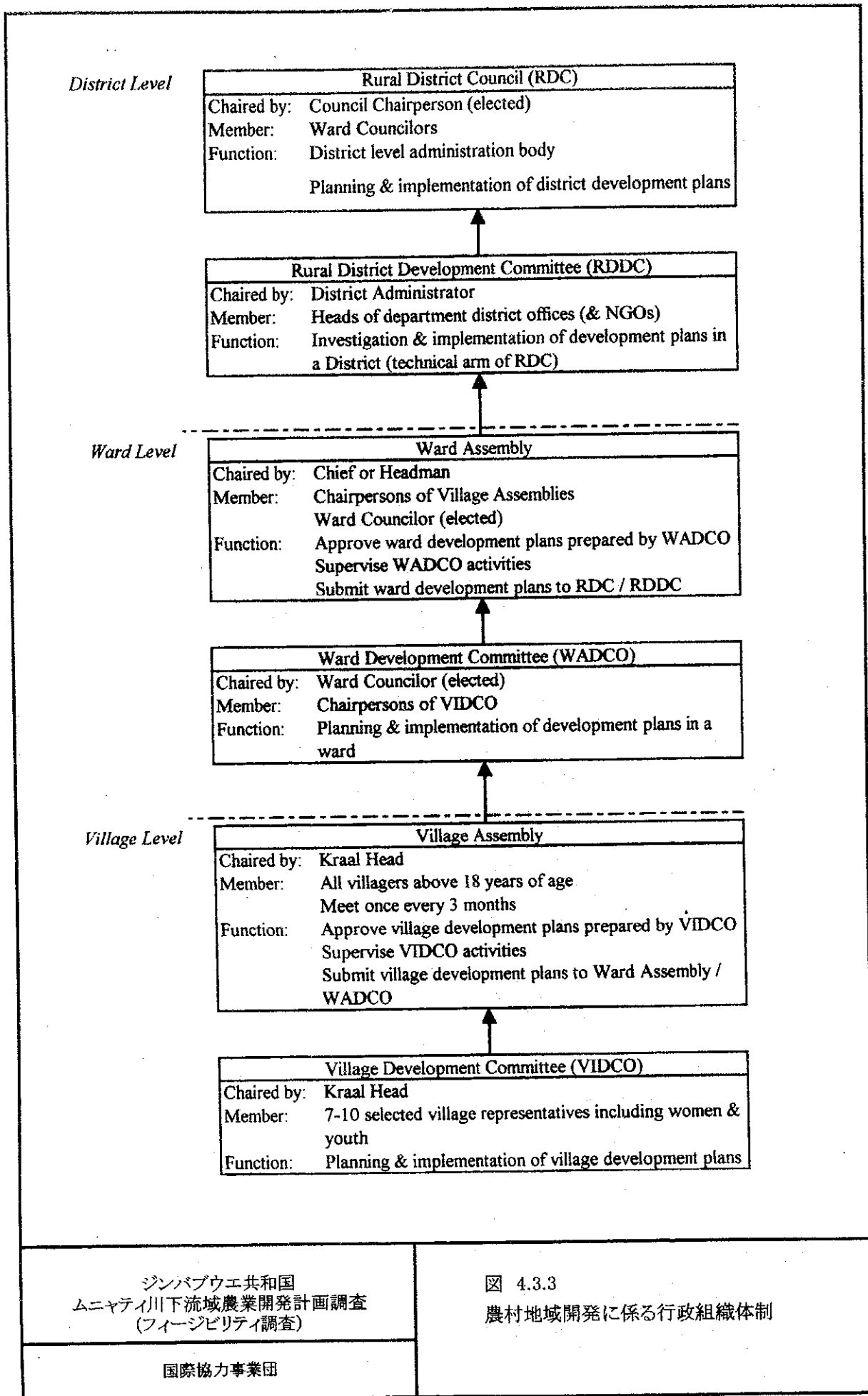
国際協力事業団



ジンバブウェ共和国
ムンヤティ川下流域農業開発計画調査
(フィジビリティ調査)

図 4.3.2
現況土地利用図

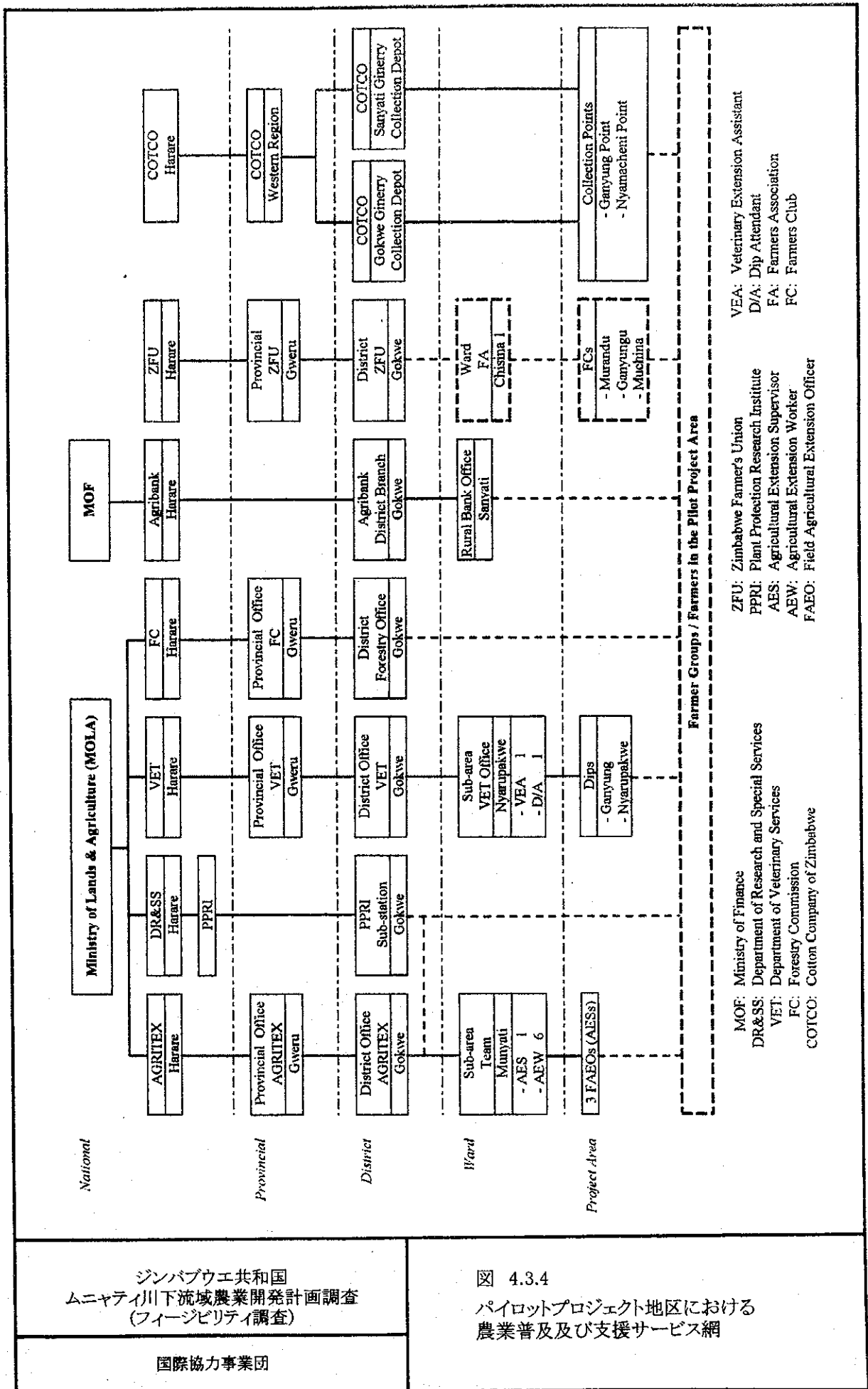
国際協力事業団



ジンバブウェ共和国
 ムニャティ川下流域農業開発計画調査
 (フィーシビリティ調査)

国際協力事業団

図 4.3.3
 農村地域開発に係る行政組織体制

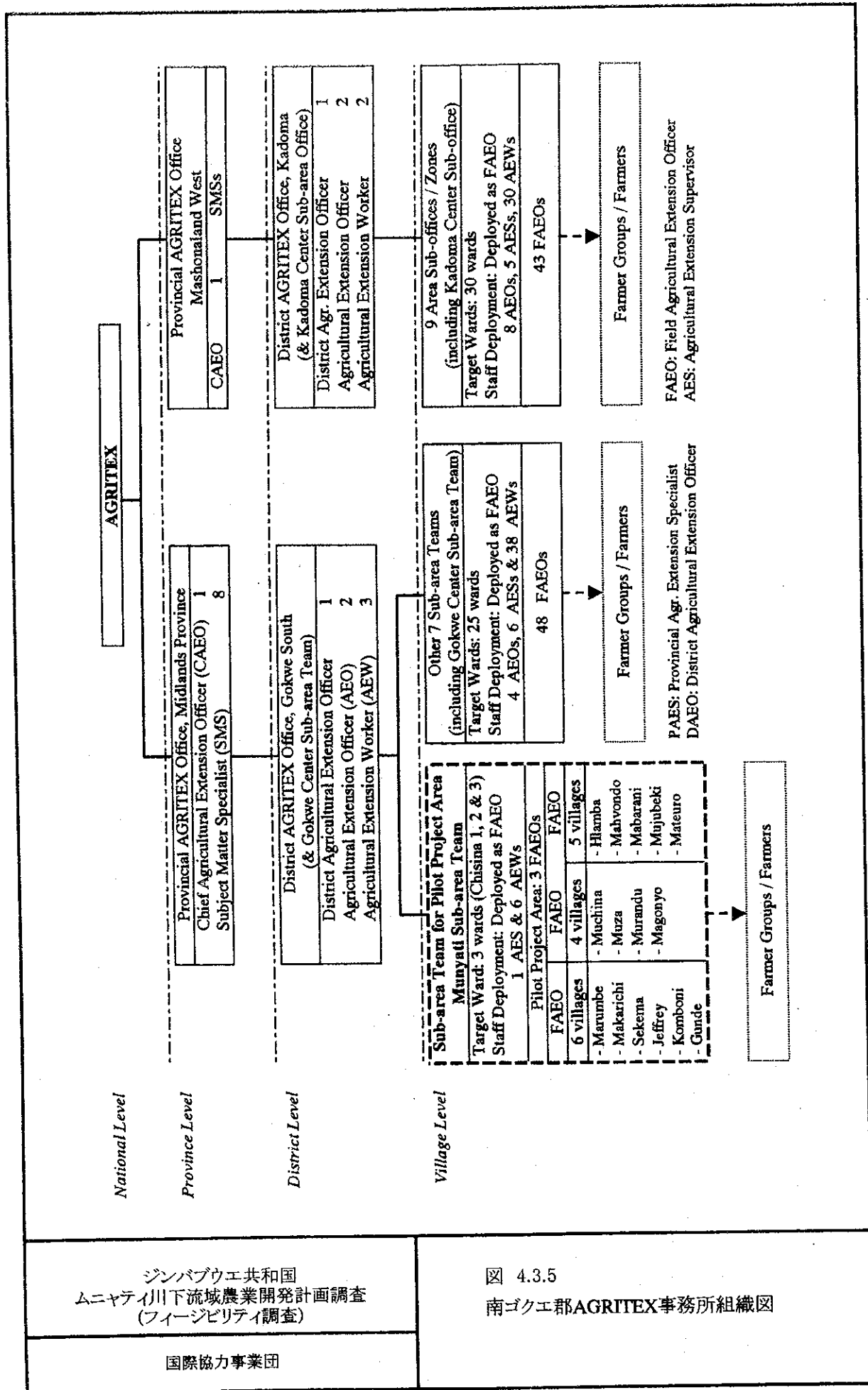


ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

図 4.3.4

パイロットプロジェクト地区における
農業普及及び支援サービス網

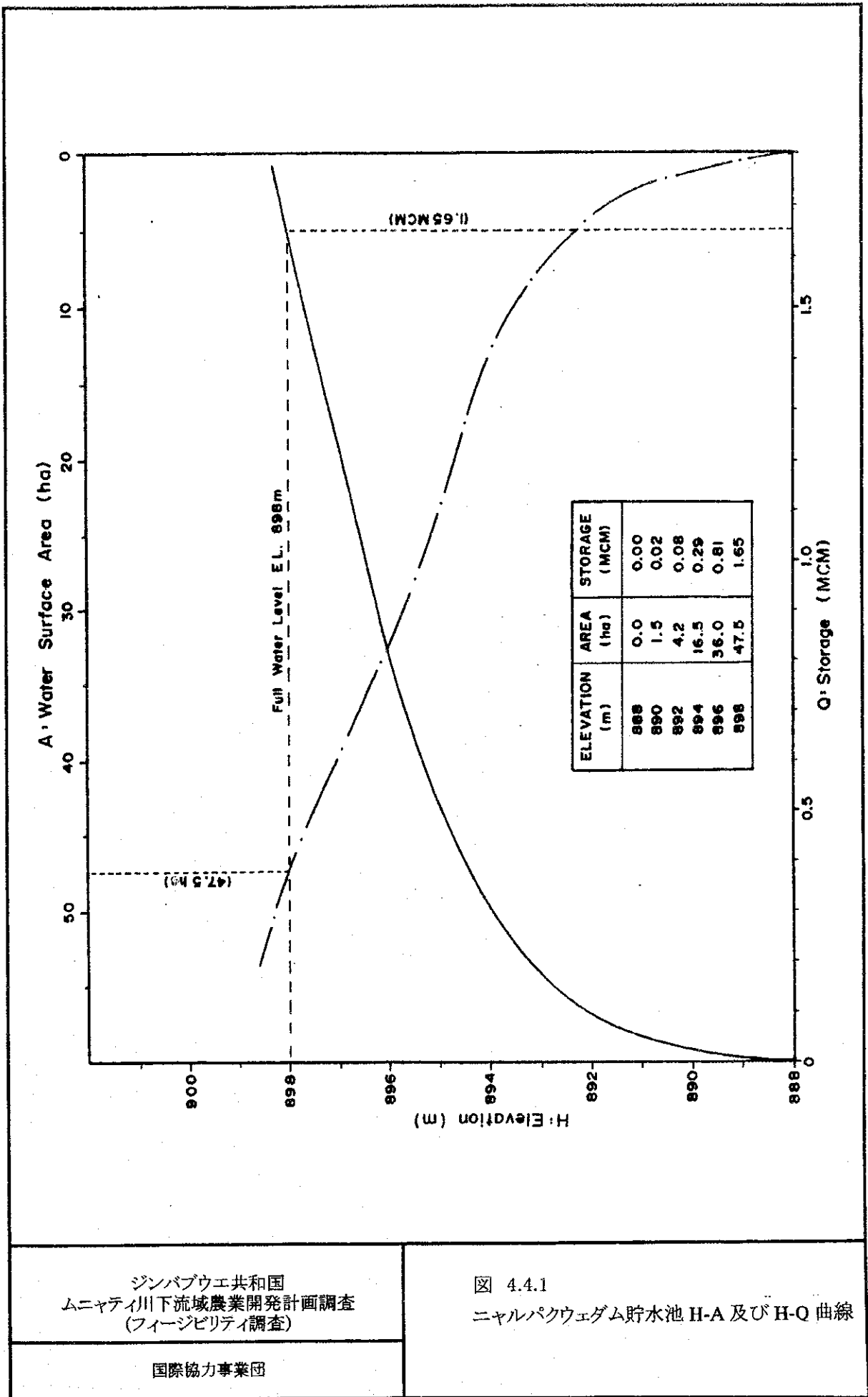


ジンバブウェ共和国
 ムニャティ川下流域農業開発計画調査
 (フィージビリティ調査)

国際協力事業団

図 4.3.5

南ゴクエ郡AGRITEX事務所組織図



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

図 4.4.1
ニャルパクウェダム貯水池 H-A 及び H-Q 曲線

NET IRRIGATION AREA

VILLAGE AREA IN HECTARES		DISCHARGE IN L/S
Magonyo (M)	Section A=20,11 Section B=17,46	21,7 18,9
Hiembo (H)	22,13	24,2



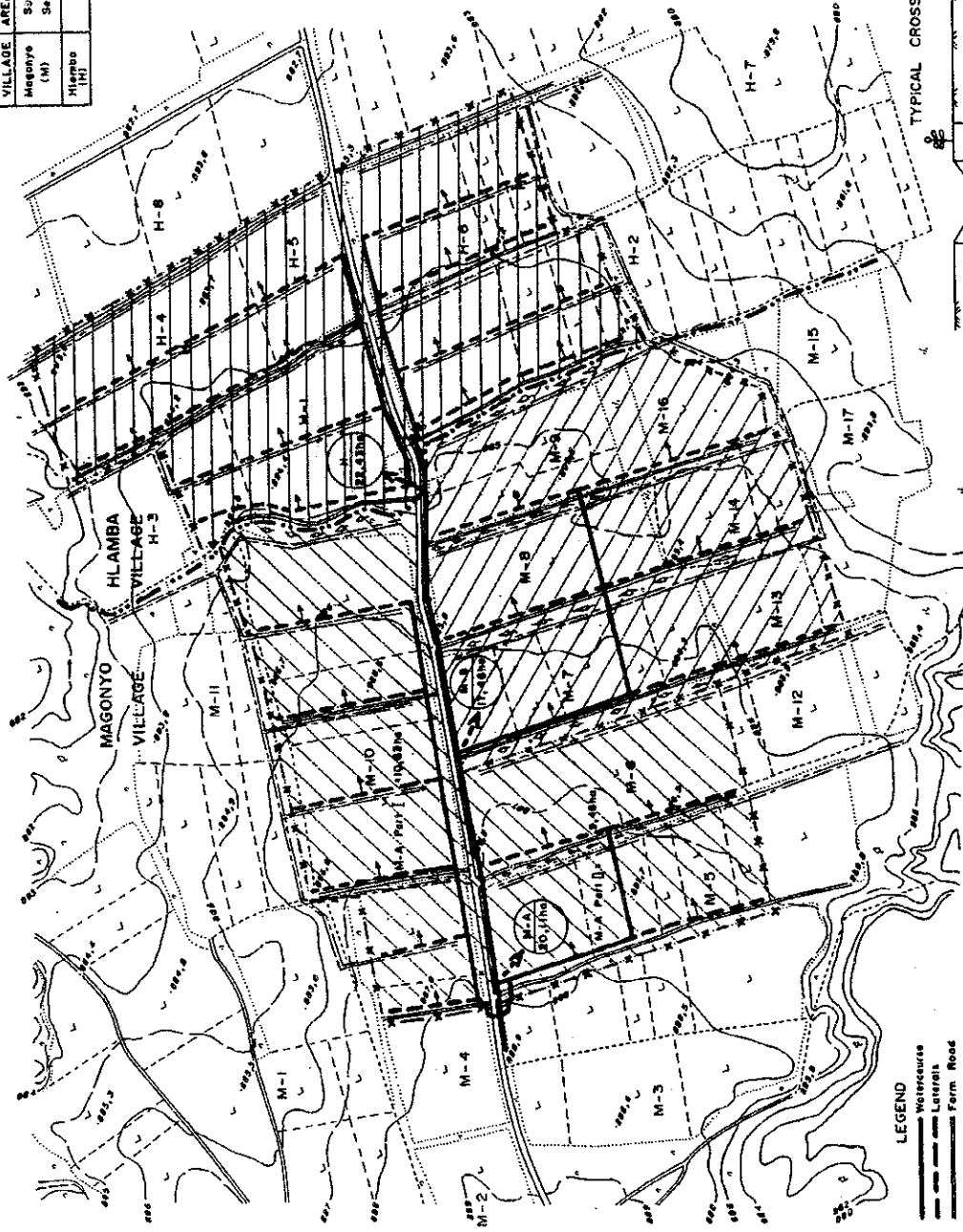
IDENTIFIED AREA
MAGONYO VILLAGE

Hectares

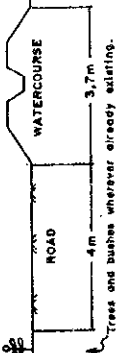
M-1	6,39
M-2	2,10
M-3	9,40
M-4	4,25
M-5	6,70
M-6	4,83
M-7	4,08
M-8	3,58
M-9	2,80
M-10	9,13
M-11	6,93
M-12	2,15
M-13	2,90
M-14	2,60
M-15	2,00
M-16	2,35
M-17	2,80
Total	73,78

HLAMBA VILLAGE

H-1	9,35
H-2	10,90
H-3	3,08
H-4	7,75
H-5	2,50
H-6	6,35
H-7	5,15
H-8	6,43
Total	46,91



TYPICAL CROSS-SECTION



LEGEND

- Watercourse
- Lateral
- Farm Road
- Drain
- Village Boundary
- Irrigation Area

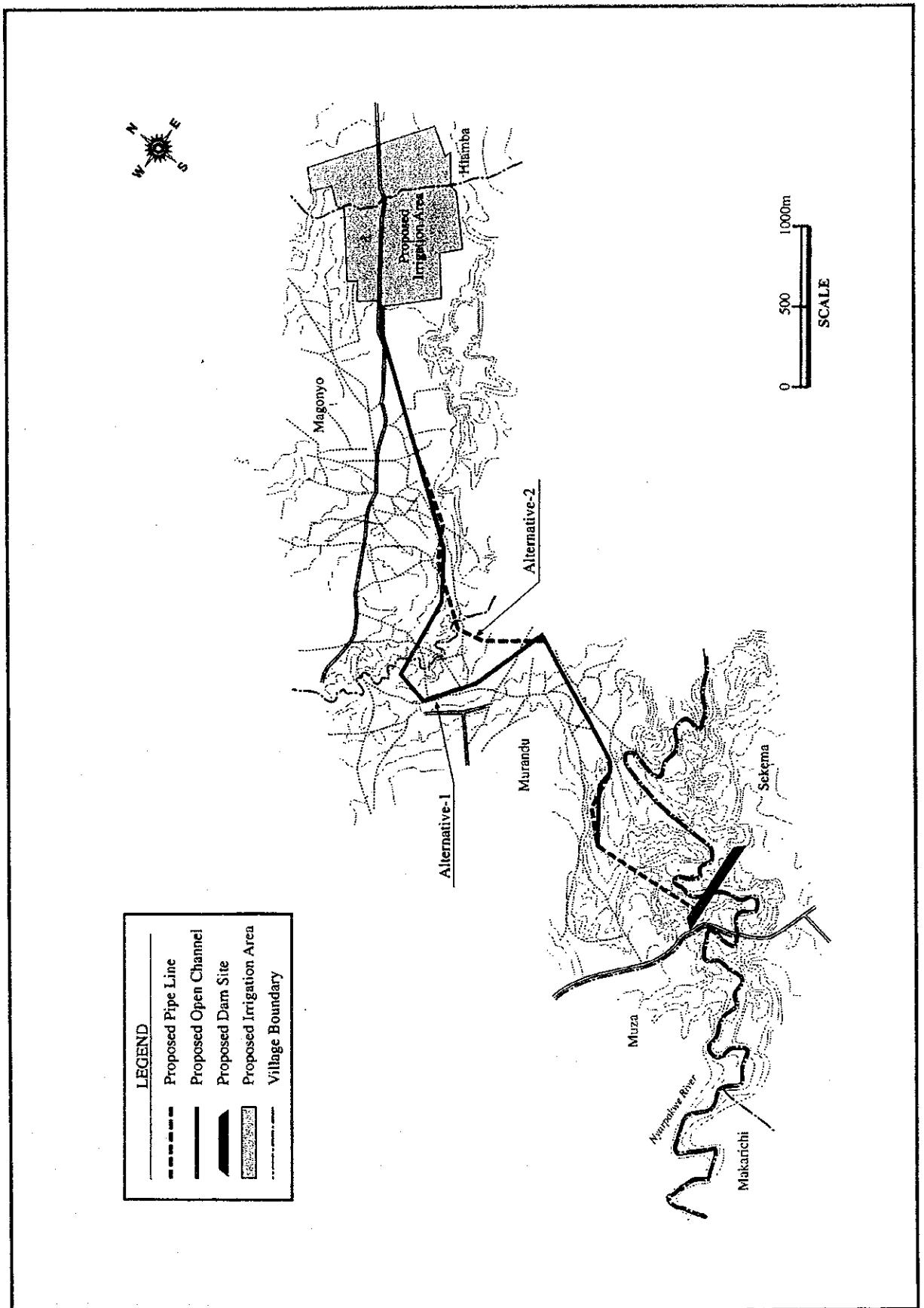
Scale 1:5 000



ジンバブウェ共和国
ムニヤティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

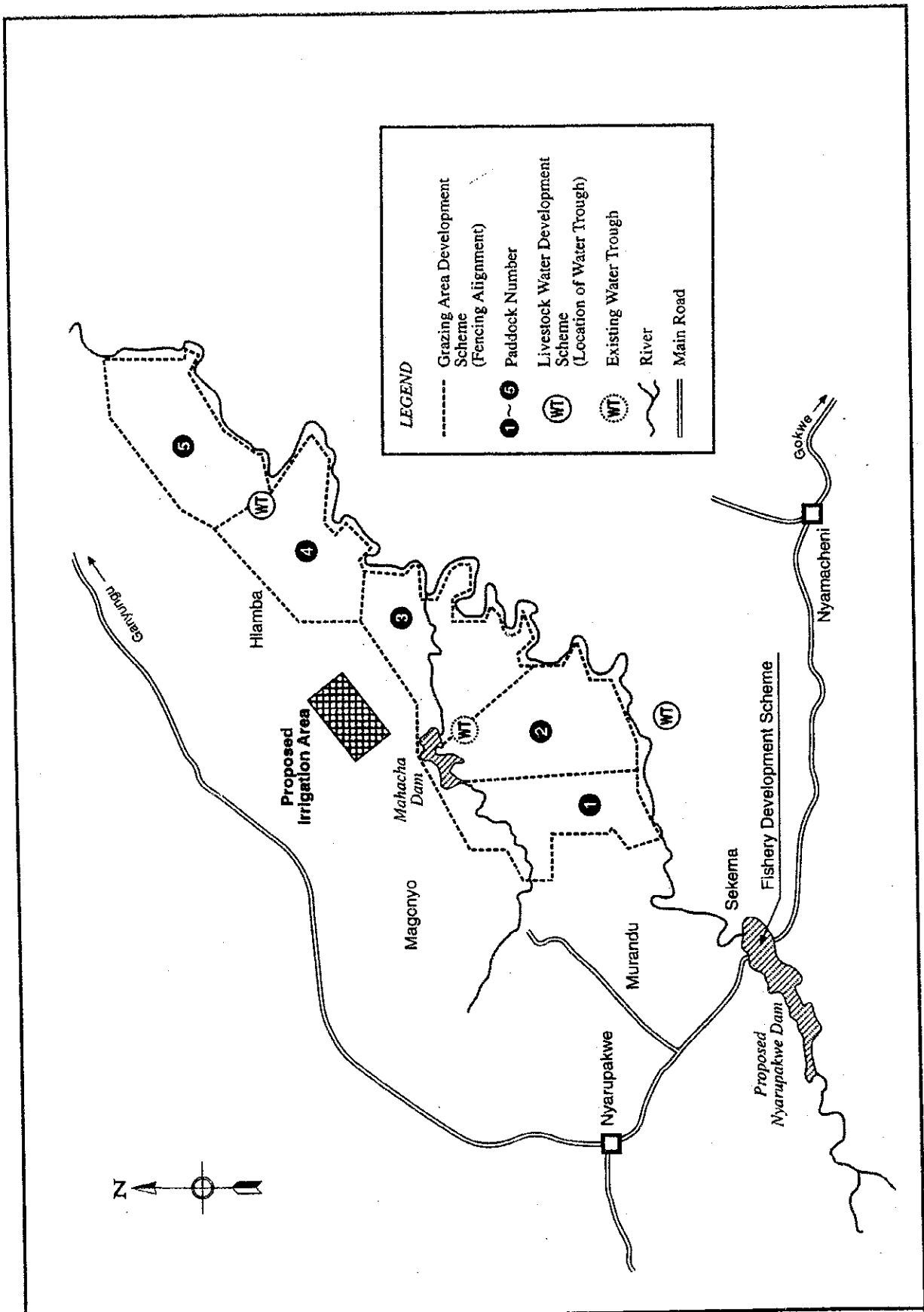
図 4.4.2
パイロット灌漑地区のレイアウト



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

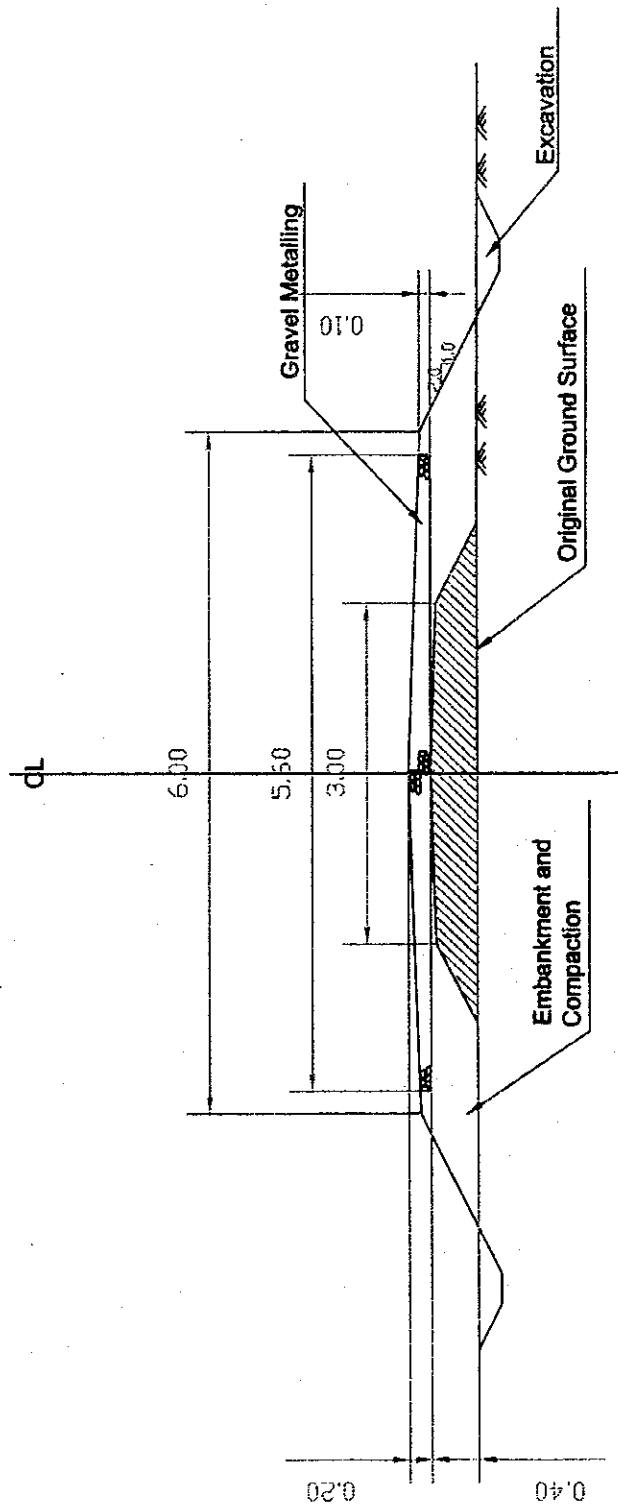
図 4.4.3
灌漑水路送水システム



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

図 4.4.4
畜産開発計画位置図

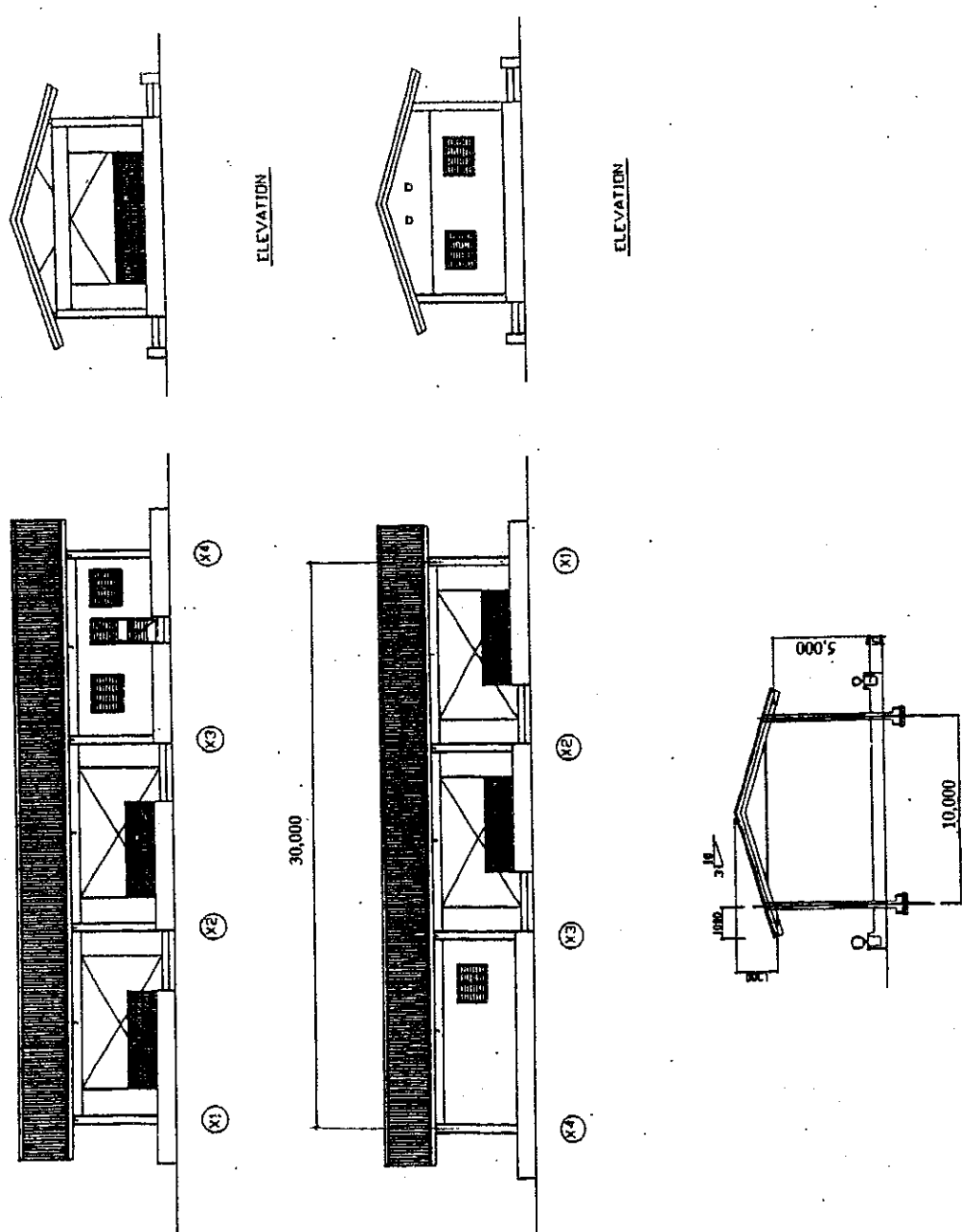


注: 特に示さない限り、全ての寸法はメーターである。

ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

図 4.4.5
ニャルパクウェーゴクエ間道路改修計画

国際協力事業団

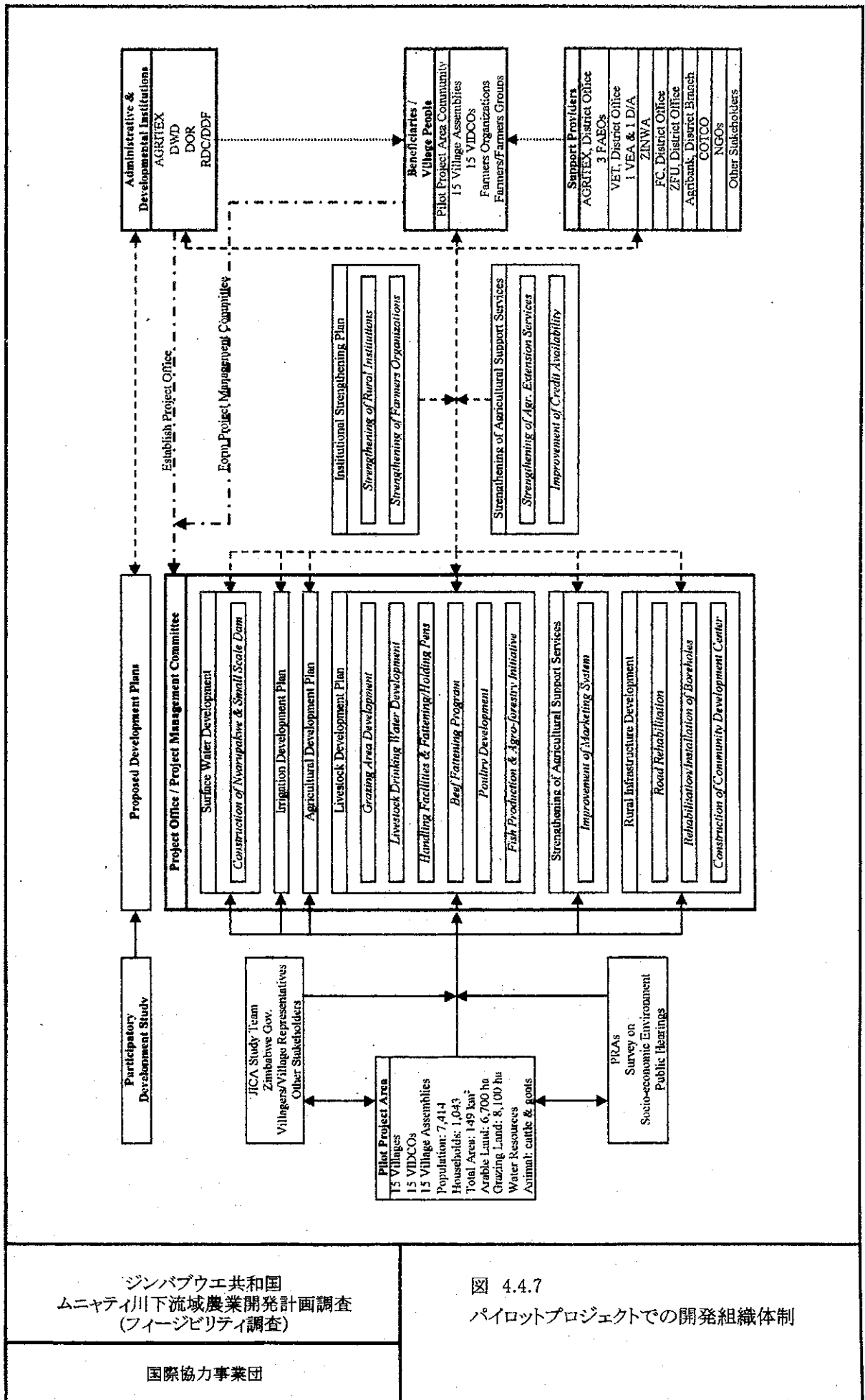


注：特に示さない限り、全ての寸法はミリメートルである。

ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フイージビリティ調査)

国際協力事業団

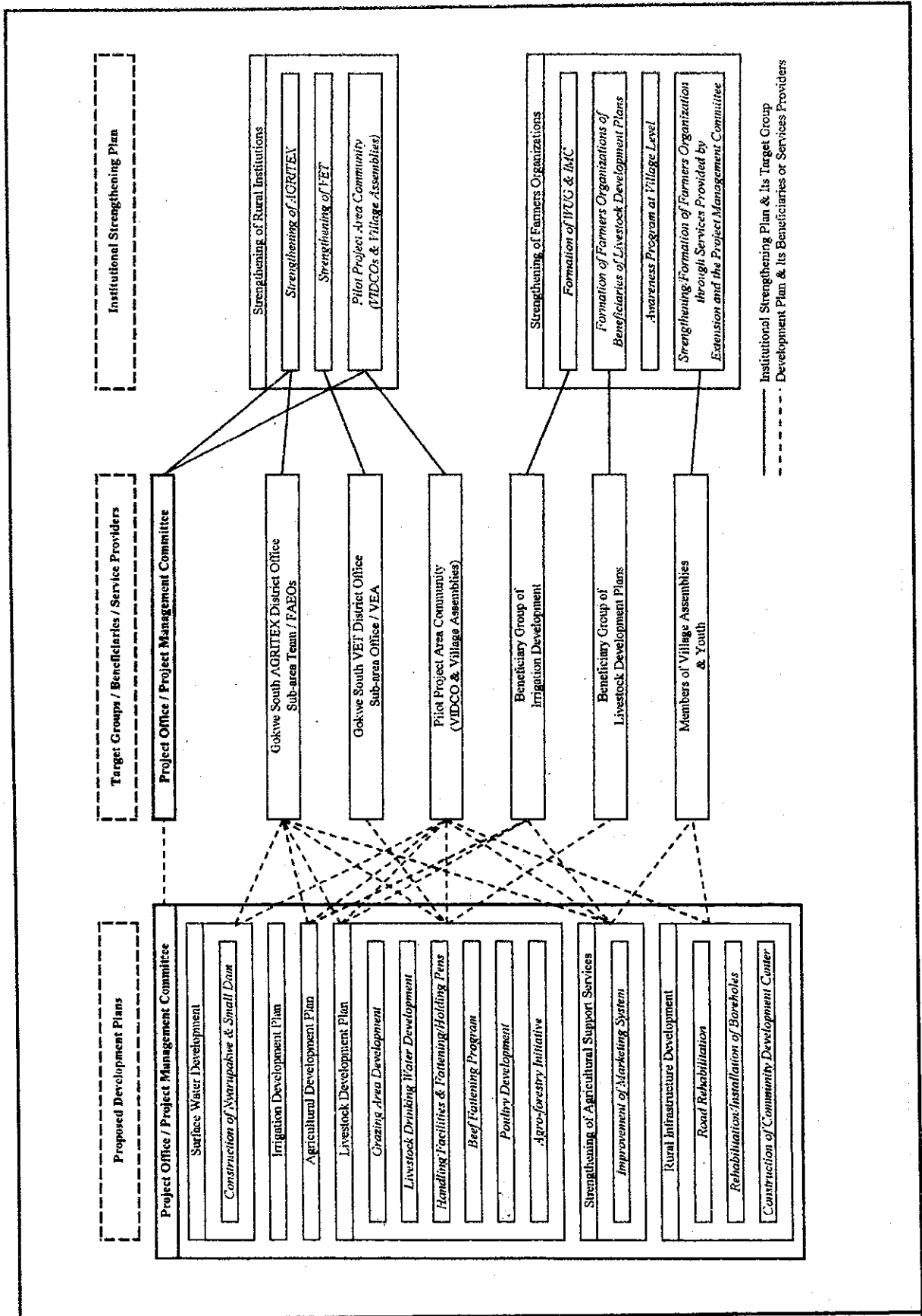
図 4.4.6
コミュニティセンター概要図



ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

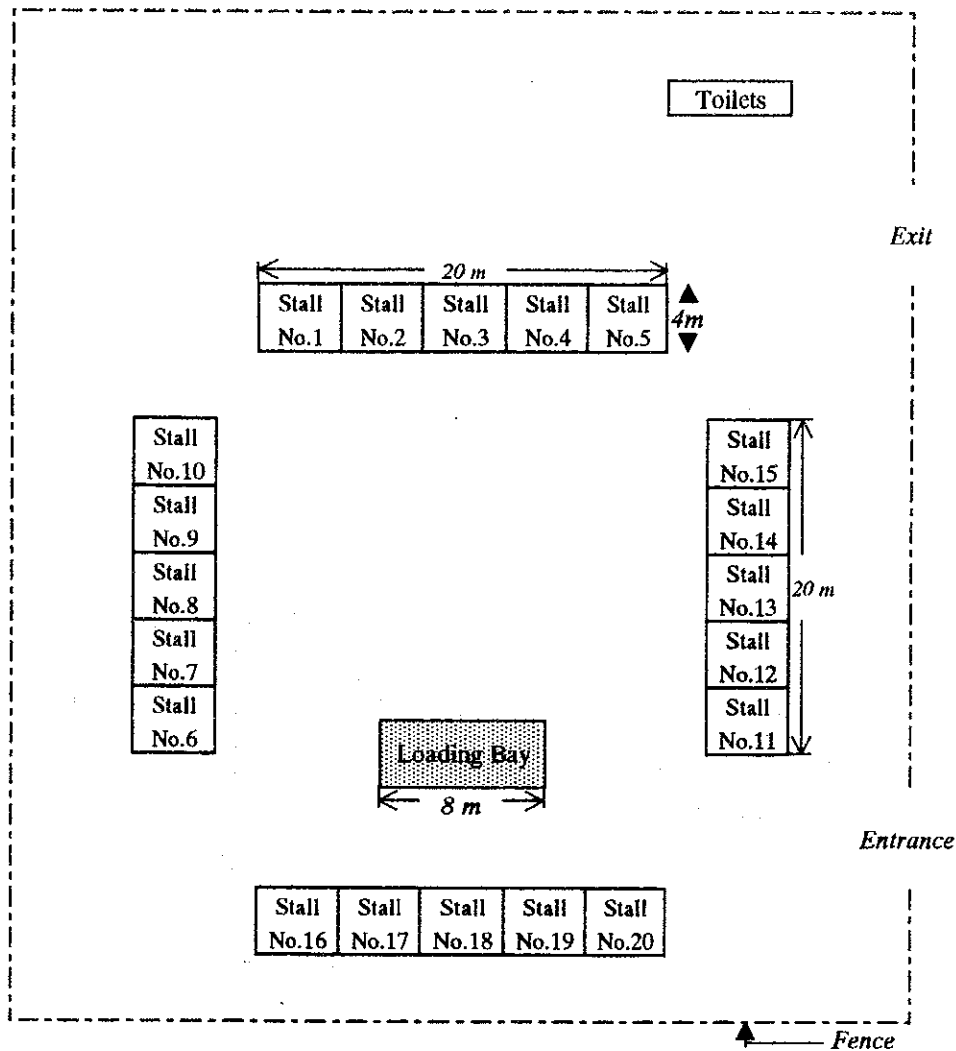
図 4.4.7
パイロットプロジェクトでの開発組織体制



ジンバブウェ共和国
ムニヤティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

図 4.4.8
パイロットプロジェクトにおける
組織強化アプローチ



Features of Proposed Open Market

Location:	Nyarupakwe Business Center
Size of Market Yard:	3,000 m ² (50 m x 60 m)
Facilities:	Market Stalls 20 stalls (4 x 4m) Loading Bay 1 unit
Structure:	Stall - roof & concrete floor; 3 sides open
Loading Bay:	Concrete platform

ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

図 4.4.9
オープンマーケット概要図

ジンバブウェ共和国
ムニャティ川下流域農業開発計画調査
(フィージビリティ調査)

国際協力事業団

図 4.4.10

パイロット事業事務所と政府関係機関
及び農民組織の関係

